4. ENVIRONMENTAL CONSEQUENCES

4.1 PROPOSED ACTION

4.1.1 Land Use and Aesthetics

4.1.1.1 Land Use

The proposed main plant would be confined to the area between the existing Gilberton Power Plant and the Mahanoy State Correctional Institution, and thus would not affect offsite land use. The ancillary facilities would not affect offsite land use due to their small size (i.e., a few acres) and location adjacent to ancillary facilities for the existing power plant. As with the Gilberton Power Plant, the proposed facilities would be consistent with existing land use plans and local zoning. The limited in-migration of workers required for plant construction and operation would not increase offsite land use for residential purposes (Section 4.1.7.3).

The culm that would be used as feedstock for the proposed facilities would be obtained from culm banks created during previous anthracite mining in the region. Following culm removal from lands in the adjacent valley and the region, these lands would be graded to minimize erosion and revegetated. Although a reasonable estimate cannot be made of the amount of land that would be reclaimed during the 3-year demonstration period (because of uncertainty in the selection of culm banks to be used and variations in bank dimensions), approximately 1,000 acres would be reclaimed over the entire 26-year operating life of the proposed facilities.

4.1.1.2 Aesthetics

As part of the proposed facilities, five 200-ft stacks and one 300-ft stack would be constructed. The five 200-ft stacks would be considerably shorter than the existing 326-ft stack at the adjacent Gilberton Power Plant, and the 300-ft stack would be slightly shorter. The new gasifier and turbine buildings would be similar in size to the existing power plant buildings. Consequently, the proposed facilities would appear as an extension of the existing industrial character of the locale rather than as an appreciable change in character. Depending on the viewpoint, other power plants, strip mines, and culm piles could also be visible (Section 3.1). Topography and vegetation would contribute in some locations to the visual screening of the proposed facilities.

As with the Gilberton Power Plant (Section 3.1), stack emissions and cooling tower plumes from the proposed facilities would occasionally be visible. Under most meteorological conditions, the atmosphere would be unsaturated and would provide enough mixing so that the water vapor from the cooling towers would not condense. However, during meteorological conditions when the atmosphere is nearly saturated, winds are light, and mixing is very low (i.e., during some early morning hours), condensation is possible, which would appear in the form of a cooling tower plume and/or fog (Section 4.1.2.2).

The Federal Aviation Administration would regulate the marking and lighting of temporary and permanent structures associated with the proposed facilities (Section 7.1). Generally, construction cranes and other elevated equipment require lighting if their height above the ground exceeds 200 ft. The 300-ft stack and perhaps the 200-ft stacks would require medium- or high-intensity flashing white obstruction lights. The lights would operate at reduced intensity during the night. Because this type of lighting is currently installed and operating on the Gilberton Power Plant's stack, the additional lighting would be consistent with the area's industrial appearance.

In summary, because the visual landscape of the area is already conspicuously marked with industrial structures (Section 3.1), the proposed facilities would not alter the industrial appearance of the site and, accordingly, would not degrade the aesthetic character of the area.

4.1.2 Atmospheric Resources and Air Quality

This section evaluates potential impacts to atmospheric resources that could result from construction and operation of the proposed facilities. Section 4.1.2.1 discusses effects of construction, including fugitive dust associated with earthwork and excavation. Section 4.1.2.2 discusses operational effects, including from emissions of criteria and hazardous air pollutants, regional-scale acidic deposition, and global climate change.

4.1.2.1 Construction

During construction of the proposed facilities, temporary and localized increases in atmospheric concentrations of NO_x, CO, SO_2, VOCs, and particulate matter would result from exhaust emissions of workers' vehicles, heavy construction vehicles, diesel generators, and other machinery and tools. An average of about 50 vehicles ranging from passenger vehicles to earthmovers would be used for construction activities on the site, with a peak of about 75 vehicles. Construction vehicles and machinery would be equipped with standard pollution-control devices to minimize emissions. These emissions would be very small compared to regulatory thresholds typically used to determine whether further air quality impact analysis is necessary [such as 40 CFR Part 93.153(b)].

Fugitive dust would result from clearing, excavation, and earthwork. Most of this work would occur at the 75-acre main plant site. Minor clearing and grading activities would occur at the approximately 1-acre site of the new beneficiation plant (or expansion of the existing facility) in the adjacent valley to the north of the main plant area and in new 12-ft wide corridors to accommodate conveyors and pipelines (Section 2.1.5.1). After completion of the initial earthmoving operations, gravel would be spread on the main access roads to mitigate further dust generation. Near the end of the construction period, these roads would be paved to minimize dust generated on the site by vehicular traffic.

The impacts of fugitive dust on offsite ambient air concentrations of particulate matter less than 10 μm in aerodynamic diameter (PM-10) were modeled using the EPA-approved SCREEN3 air dispersion model, which is a single source Gaussian plume model that predicts maximum ground-level concentrations downwind from point, area, flare, and volume sources (EPA 1995a). SCREEN3, a screening version of the ISCST3 model, provides conservative results (forming an upper bound) using a full range of 54 potential meteorological conditions (i.e., conditions representing different combinations of atmospheric stabilities and wind speeds). This screening meteorological data set typically results in appreciably greater modeled concentrations compared to modeled concentrations using actual meteorological data, which are not available at the proposed site or a nearby representative location (Section 3.2.1). The SCREEN3 model was run using flat terrain, which is conservative for a nonbuoyant ground-level source such as fugitive dust generated during earthwork. Conversion factors were used to adjust the maximum 1-hour concentrations predicted by SCREEN3 to 24-hour and annual averages (EPA 1992), as required for comparison with PM-10 standards (Section 3.2.2).

The temporary impacts of fugitive dust from construction activities on offsite particulate concentrations would be localized because of the relatively rapid settling of larger-size fugitive dust particles. An average emission factor of 1.2 tons of total suspended particulate matter per acre per month was assumed (EPA 1985). Of these emissions, roughly 30% of the mass would consist of PM-10 (Kinsey and Cowherd 1992). To minimize fugitive dust emissions, water spray trucks would dampen exposed soil with water as necessary, which was assumed would reduce fugitive dust by 50% (EPA 1985). Because construction on the 75-acre main plant site would be staggered, the maximum area undergoing heavy earthwork at any one time was assumed to be 10 acres.

The total concentrations, obtained by adding maximum modeled concentrations (adjusted by the conversion factors) to their corresponding background concentrations, were compared with the NAAQS (Section 3.2.2). The background concentrations used (i.e., 54 $\mu g/m^3$ for the 24-hour averaging period and 25 $\mu g/m^3$ for the annual average) were recorded in 2003 at the nearest PM-10 monitoring station, located in Reading (Section 3.2.2). Consequently, the maximum modeled 24-hour concentration should not exceed 96 $\mu g/m^3$ because when it is added to the 54 $\mu g/m^3$ background concentration, the sum should not exceed the NAAQS of 150 $\mu g/m^3$ [96 (modeled) +54 (background) =150 (total)]. Similarly, the maximum modeled annual concentration should not exceed 25 $\mu g/m^3$ because when it is added to the 25 $\mu g/m^3$ background concentration, the sum should not exceed the NAAQS of 50 $\mu g/m^3$ [25 (modeled) +25 (background) =50 (total)].

During major construction, however, PM-10 concentrations typically exceed the NAAQS near the edge of the disturbed area. For the proposed construction, modeling results indicated that exceedances of the 24-hour standard (i.e., maximum modeled 24-hour concentration greater than 96 $\mu g/m^3$) could occasionally occur up to 2,800 ft (about 0.5 mile) from the nearest edge of the construction area if construction were as intense and widespread as assumed. Because concentrations would decrease as distances increase, no exceedances would be expected at greater distances. No exceedances of the annual standard (i.e., maximum modeled annual concentration greater than 25 $\mu g/m^3$) would be expected at distances greater than about 2,100 ft (less than 0.5 mile) from the nearest edge of the construction area. No exceedances would be expected at any residential locations because no residences are within 0.5 mile of the main plant area (Section 3.10). No exceedances would be expected at any locations likely to be frequented by a member of the general public. Exceedances could occasionally occur at the site of the Mahanoy State Correctional Institution, located about 1,000 ft (0.2 mile) east of the nearest edge of the main plant area. However, inmates and employees would not be exposed to outside air except during periods of outdoor activity, and therefore the overall risk that a person could be harmed would be small.

Actual concentrations would likely be less than predicted because of the conservative assumptions, including linking worst-case meteorological conditions (occurring during the nighttime) with the emission factor described above. Actual emissions during these nighttime meteorological conditions would be considerably less because no machinery would be operating and because of the low wind speed (about 2 miles per hour) associated with worst-case meteorological conditions, which would minimize exposed soil from becoming airborne.

A similar modeling analysis was not conducted for the impacts of fugitive dust on offsite ambient air concentrations of PM-2.5. The annual PM-2.5 background concentration of 16 $\mu g/m^3$ recorded in 2003 at the closest monitoring station, located in Reading (Section 3.2.2), exceeded the NAAQS of 15 $\mu g/m^3$, but Schuylkill County is designated as a PM-2.5 attainment area (Section 3.2.2). Consequently, the Reading monitoring station is not an accurate indicator of existing PM-2.5 concentrations in Schuylkill County, which has no monitoring station. However, as with PM-10 concentrations, PM-2.5 concentrations from fugitive dust emissions would be expected to exceed the NAAQS near the edge of the disturbed area, but decrease to within the NAAQS in a short downwind distance. Because the PM-2.5 concentrations at the Reading monitoring station are greater than expected in Schuylkill County, PM-10 concentrations are also likely to be greater in Reading than in Schuylkill County, which is another indication that the PM-10 modeling analysis using Reading ambient air data is conservative.

During site preparation, open burning of cleared trees and other vegetation would be conducted to reduce or eliminate the amount of vegetation requiring removal off the site (Section 4.1.8). Open burning would not be conducted during drought conditions in which advisories have been issued by the Pennsylvania Department of Environmental Protection. Non-hazardous construction waste would also be burned. Particulate emissions generated during burning would be temporary and intermittent. Although Mahanoy and West Mahanoy Townships have no ordinances regarding open burning, the fire chiefs would be notified prior to each occurrence so that they would be aware of the burning and could provide guidance.

On March 18, 2005, the Pennsylvania Department of Environmental Protection issued Air Quality Program Permit No. 54-399-034 for the proposed facilities. The permit, which expires on March 31, 2010, addresses open burning during preparation of the proposed site. Specifically, the permit states that open burning of cleared trees and other vegetation may not be visible outside the property, malodorous air contaminants may not be detectable outside the property, and emissions may not cause harm to human or animal health, vegetation, or property.

4.1.2.2 Operation

This section discusses potential air quality impacts resulting from operation of the proposed facilities. Based on a plant operating rate of 7,500 hours per year (an 85% capacity factor), air emissions from the proposed facilities would total less than 100 tons per year for each of the criteria pollutants (Section 2.1.6.1). Plant-wide SO_2 emissions from the proposed facilities would be about 29 tons per year, NO_x emissions would be about 70 tons per year, particulate emissions would be about 23 tons per year, and CO emissions would be about 54 tons per year. Volatile organic compound (VOC) emissions would be about 28 tons per year (see footnote b of Table 2.1.1 for potential-to-emit annual emissions included in the air permit application submitted to the Pennsylvania Department of Environmental Protection). As a measure of the magnitude of the expected emissions, a source (i.e., the proposed facilities) with potential emissions under the threshold of 100 tons per year for a specific pollutant would not be considered a major stationary source of that pollutant, as defined by the Clean Air Act's Prevention of Significant Deterioration (PSD) regulations (40 CFR Part 51.166). Because the proposed facilities would be considered a minor new source of all regulated pollutants by the Pennsylvania Department of Environmental Protection, no modeling is required for regulatory applications.

Air Quality Program Permit No. 54-399-034, issued by the Pennsylvania Department of Environmental Protection for the proposed facilities, establishes maximum allowable limits for total facility emissions during any consecutive 12-month rolling period: 99.9 tons for SO_2, 99.9 tons for NO_x, 99.9 tons for PM-10, 99.9 tons for CO, and 49.9 tons for VOCs. The permitted limits, which are intentionally slightly larger than the expected emissions, function as a cap to ensure that the proposed facilities would be a minor new source of all regulated pollutants.

Emissions of air pollutants would be discharged primarily from five 200-ft stacks located in the main plant area. The stacks would be associated with the heat recovery steam generator (HRSG), F-T product work-up area (2 stacks), thermal oxidizer, and tank truck loading area. The HRSG stack would emit the most NO_x (43 tons per year), particulate matter (21 tons per year), and CO (31 tons per year), while the thermal oxidizer stack would emit the most SO_2 (17 tons per year). Infrequently, a 300-ft emergency stack would flare quenched, raw synthesis gas from the gasifier during start-ups and during unexpected shut-downs, such as during loss of power or loss of cooling water.

Sources of air pollutants other than stacks would include plant vehicular traffic and personal commuter vehicles. Approximately 50 vehicles ranging from passenger vehicles to tanker trucks would be used during operations on the site. These vehicles would be equipped with standard pollution-control devices to minimize emissions, which would be very small compared to regulatory thresholds typically used to determine whether further air quality impact analysis is necessary [such as 40 CFR Part 93.153(b)]. The small amount of traffic would not contribute appreciably to ambient air pollutant concentrations in the area. Additional particulate matter would be generated from handling and transfer of anthracite culm, petroleum coke, limestone, and process wastes and byproducts. To reduce these particulate emissions, the number of handling and transfer points would be minimized, the conveyors and material loading and unloading points would be enclosed, and wetting systems and collection devices (e.g., baghouses) would be installed.

Predicted Concentrations of Criteria Pollutants

The ISCST3 atmospheric dispersion model (EPA 1995b) was used to estimate maximum increases in ground-level concentrations of SO_2, NO_2, PM-10, and CO. The analysis conservatively included emissions from all 5 process stacks operating simultaneously.[1] Because exact stack locations within the main plant area have not yet been determined, the center of each appropriate process area (e.g., tank truck loading area) was used for the stack coordinates. Maximum potential hourly emissions and a 100% capacity factor were used in the modeling. All particulate emissions were conservatively assumed to be less than or equal to 10 μm in aerodynamic diameter (PM-10) for comparison with the standards. Initially, all NO_x emissions were conservatively assumed to be in the form of NO_2 for comparison with the standard.

Because no wind data have been archived from a location near enough to be representative of the proposed site (Section 3.2.1), maximum concentrations were calculated for the same full range of 54 potential meteorological conditions used by the SCREEN3 model (Section 4.1.2.1). The ISCST3 model was run for each of these meteorological conditions for each of 360 wind directions (at 1° compass intervals). Concentrations were modeled at over 30,000 locations (receptors) along or outside the WMPI property boundaries at a spacing of 650 ft and 1° compass intervals at distances of up to 12 miles from the main plant area, as well as for specified receptors along nearby public roads. Topography was included in the modeling. Because the height of the proposed stacks would be at least 2.5 times the height of the buildings in the main plant area (i.e., Good Engineering Practice stack height), wake effects from building downwash were not considered. Due to the absence of representative wind data, conversion factors were used (as in Section 4.1.2.1) to adjust the maximum 1-hour concentrations predicted by ISCST3 to 3-hour, 8-hour, 24-hour, and annual averages (EPA 1992) to facilitate comparison with applicable averaging periods for SO_2, NO_2, PM-10, and CO standards (Section 3.2.2).

In this analysis, significant impact levels were used to measure the significance of the maximum predicted concentrations (EPA 1990). The significant impact levels are much more stringent than the NAAQS (Table 3.2.1) and PSD Class II increments (Table 3.2.2), and even more stringent or the same as the PSD Class I increments (Table 3.2.2). According to EPA guidelines (EPA 1990), a preliminary modeling analysis using significant impact levels should include only the emissions associated with the proposed facilities to determine if the facilities would have a significant impact on ambient air quality. If the maximum predicted concentrations are less than the significant impact levels, additional modeling including other sources and background concentrations is not required (EPA 1990).

[1] The SCREEN3 model was not used because it is limited to simulating atmospheric transport and dispersion of air emissions from a single source.

Results indicate that maximum concentrations are predicted to be less than their corresponding significant impact levels, with the exception of the annual NO_2 concentration, which has a value of 1.1 $\mu g/m^3$ versus a significant impact level of 1 $\mu g/m^3$ (Table 4.1.1). However, NO_x emissions are composed of NO emissions, as well as NO_2 emissions, and not all NO emissions convert to NO_2 in the atmosphere. Consequently, the analysis was refined by relaxing the initial conservative assumption that all NO_x emissions were in the form of NO_2. EPA's Guideline on Air Quality Models (40 CFR Part 51, Appendix W) recommends an approach using the ambient ratio method with a NO_2-to-NO_x ratio of 0.75 (the annual national default ratio) to more accurately predict ambient NO_2 concentrations in the area of concern. Using this approach, the revised maximum annual NO_2 concentration is predicted to be 0.8 $\mu g/m^3$, which is less than its significant impact level of 1 $\mu g/m^3$. Therefore, additional modeling including other sources and background concentrations is not required for any of the pollutants. Because of the conservative assumptions used in the analysis, actual degradation of air quality should be even less than the small amounts predicted.

Table 4.1.1. Maximum predicted air pollutant concentrations from proposed project operations compared to significant impact levels

Averaging period	SO_2 ($\mu g/m^3$)	NO_2 ($\mu g/m^3$)	PM-10 ($\mu g/m^3$)	CO ($\mu g/m^3$)	Significant impact level ($\mu g/m^3$)
1-hour	--	--	--	11.4	2,000
3-hour	10.6	--	--	--	25
8-hour	--	--	--	8.0	500
24-hour	4.7	--	0.8	--	5
Annual	0.9	1.1 (initial) 0.8 (revised)	0.2	--	1

Maximum concentrations for all pollutants were predicted to occur at the same location on top of Locust Mountain, an undeveloped forested area slightly over 3 miles north of the main plant area and immediately northeast of Shenandoah. Concentrations at other locations, including the nearby Mahanoy State Correctional Institution, would be less. Concentrations would be negligible at the nearest PSD Class I area, about 130 miles to the southeast (Section 3.2.2), because dispersion of pollutants at that distance would reduce atmospheric concentrations to a small fraction of the maximum modeled concentrations, which are predicted to be less than PSD Class I increments at the location of their maximum impact on Locust Mountain.

No significant impact levels or PSD increments currently exist for PM-2.5. However, assuming conservatively that all particulate emissions are less than or equal to 2.5 μm in aerodynamic diameter (PM-2.5), the maximum 24-hour concentration of 0.8 $\mu g/m^3$ would be only 1% of the corresponding NAAQS of 65 $\mu g/m^3$ (Table 3.2.1). Similarly, the maximum annual concentration of 0.2 $\mu g/m^3$ would be about 1% of the corresponding NAAQS of 15 μg/m^3 (Table 3.2.1). These small percentages would not be expected to result in violations of the PM-2.5 NAAQS, for which Schuylkill County is in attainment (Section 3.2.2).

No appreciable Pb emissions would occur from operation of the proposed facilities. Concentrations of Pb in recent years have been well below NAAQS, largely because of the decreased use of leaded gasoline in automobiles. Therefore, Pb emissions from the proposed facilities are not evaluated further.

Ozone (O_3) is not emitted directly from a combustion source but is formed from photochemical reactions involving emitted VOCs and NO_x. Because the reactions involved can take hours to complete, O_3 can form far from the sources of its precursors (the VOCs and NO_x that initiate its formation). Therefore, the contribution of an individual source to O_3 concentrations at any particular location cannot be readily quantified. Stack emissions of NO_x from the proposed facilities would be about 70 tons per year, which would be less than 1% of Schuylkill County's NO_x emissions inventory of 8,335 tons per year in 1999, the latest year with an available inventory. Stack VOC emissions would be about 28 tons per year, which would be less than 0.4% of the county's VOC emissions inventory of 7,840 tons per year in 1999. Because the nearest O_3 monitoring station is located in Reading, about 35 miles south-southeast of Gilberton (Section 3.2.2), existing ambient O_3 concentrations in the area are uncertain. The small percentage increases in NO_x and VOC emissions would not be likely to degrade O_3 concentrations sufficiently to cause violations in the O_3 NAAQS, but the magnitude of the degradation cannot be quantified.

Conformity Review

Schuylkill County is in attainment with NAAQS and state ambient air quality standards for all pollutants (Section 3.2.2). Schuylkill County was formerly designated as nonattainment for the 1-hour O_3 standard, but EPA revoked the standard on June 15, 2005. Although no longer required, DOE performed a conformity review prior to June 15, 2005, to assess whether a full-scale conformity determination was needed to demonstrate that activities associated with the proposed project would conform to applicable implementation plans for bringing the area into attainment with the 1-hour O_3 NAAQS (40 CFR Part 93, Subpart B). A conformity determination was not required for O_3 if the total of direct and indirect emissions of O_3 precursors (i.e., NO_x and VOC emissions) resulting from the proposed project would be less than appropriate thresholds [40 CFR Part 93.153(c)] and would also be less than 10% of the emissions inventory for the nonattainment area [40 CFR Part 93.153(i)].

Because Pennsylvania is part of an O_3 transport region (Clean Air Act, Title I, Part D, Section184), the appropriate thresholds in the conformity review for O_3 precursors were 100 tons per year for NO_x emissions and 50 tons per year for VOC emissions [40 CFR Part 93.153(b)]. As indicated previously, plant-wide stack emissions of NO_x would be about 70 tons per year, and plant-wide stack VOC emissions would be about 28 tons per year. While other project-related emissions (e.g., plant vehicular traffic and personal commuter vehicles) would cause slightly greater total emissions, the sums would be much less than the thresholds (i.e., the incremental emissions from other sources would be much less than 30 tons per year of NO_x emissions and 22 tons per year of VOC emissions). The total of direct and indirect emissions would be about 1% of Schuylkill County's NO_x emissions inventory of 8,335 tons per year and less than 1% of the county's VOC emissions inventory of 7,840 tons per year in 1999. These percentages were much less than the 10% threshold. Consequently, the conformity review found that a conformity determination was not required.

Hazardous Air Pollutants

Trace emissions of other pollutants would include mercury, beryllium, sulfuric acid mist, hydrochloric acid, hydrofluoric acid, benzene, arsenic, and various heavy metals. As required by the F-T synthesis process, the synthesis gas would be cleaned extensively using wet scrubbing followed by acid gas removal using a Rectisol unit, prior to sending the gas to the F-T synthesis facilities and the combined-cycle power plant. Therefore, a high percentage of hazardous air pollutants and trace elements in the synthesis gas would be removed, but no estimates of the proposed facilities' emissions of these pollutants are currently available. Part of the purpose of the proposed project is to generate environmental data, including hazardous air pollutant measurements, from the operation of the integrated technologies at a sufficiently large scale to allow industries and utilities to assess the project's potential for commercial application (Section 1.4).

Emissions of hazardous air pollutants (e.g., mercury) from the proposed facilities would likely be very similar to emissions from state-of-the-art integrated gasification combined-cycle facilities due to the similarity in the technologies, including synthesis gas cleanup equipment. Extensive characterization of trace elements during demonstration of a Shell pilot-scale integrated gasification combined-cycle plant from 1987 to 1991 indicated that scrubbing in the synthesis gas cleanup train, upstream of the acid gas removal equipment, was very effective in removing volatile trace elements (SAIC 2002). Volatile trace elements were not detected in the clean product synthesis gas or the acid gas, with the exception of lead in the clean synthesis gas and selenium in the acid gas, which were present at less than 1% of the total inlet feed rate to the gasifier.

Air Quality Program Permit No. 54-399-034, issued by the Pennsylvania Department of Environmental Protection for the proposed facilities, establishes maximum allowable limits for total facility emissions of less than 10 tons for any single hazardous air pollutant (e.g., mercury) and less than 25 tons altogether for any combination of hazardous air pollutants during any consecutive 12-month rolling period. The permitted limits function as a cap to ensure that the proposed facilities would be a minor new source of hazardous air pollutants under the National Emissions Standards for Hazardous Air Pollutants regulations. Based on the same averaging period, the permit also specifies a maximum allowable limit of 100 tons for ammonia and 15 tons for sulfuric acid mist, which are not designated as hazardous air pollutants under the National Emissions Standards for Hazardous Air Pollutants regulations.

Visibility

Visibility, or background visual range, is defined as the maximum distance a large, black object can be observed on the horizon. The scenic quality of natural landscapes and their color, contrast, and texture, are improved by good visibility. Visibility, as a measure of clarity of the atmosphere, has been established as an important air-quality-related value of national parks and wilderness areas that are designated as PSD Class I areas. Because concentrations of pollutants from the proposed facilities would be negligible at the nearest PSD Class I area, about 130 miles to the southeast (Section 3.2.2), no degradation in visibility would be perceptible.

Acidic Deposition

Acid rain, the popular name for acidic deposition, occurs when SO_2 and NO_x are chemically transformed and transported in the atmosphere and deposited on the earth's surface in the form of wet (rain, snow, fog) or dry (particle, gas) deposition. SO_2 and NO_x are readily oxidized in the atmosphere to form sulfates and nitrates. Subsequently, the sulfates and nitrates may form sulfuric acid and nitric acid when combined with water, unless neutralized by other chemicals present. Acidic deposition contributes to the acidification of lakes and damage to ecological resources. SO_2 and NO_x can be transported by the wind for hundreds of miles from one region to another. Therefore, air over any given area will contain some residual emissions from distant areas and infusions received from nearby areas. This continuing depletion and replenishment of emissions along the path of an air mass makes it extremely difficult to determine relationships between specific sources of emissions and acidic deposition at any particular location.

As a comparison to evaluate acidic deposition, stack SO_2 emissions from the proposed facilities would be about 29 tons per year, which would be about 0.4% of Schuylkill County's SO_2 emissions inventory of 8,046 tons per year in 1999. Stack emissions of NO_x from the proposed facilities would be about 70 tons per year, which would be less than 1% of the county's NO_x emissions inventory of 8,335 tons per year in 1999. Because these emissions are less than 1% of existing county emissions, no perceptible changes in acidic deposition would be expected.

Global Climate Change

A major worldwide environmental issue is the possibility of major changes in the global climate (e.g., global warming) as a consequence of increasing atmospheric concentrations of "greenhouse" gases (Mitchell 1989). The atmosphere allows a large percentage of incoming solar radiation to pass through to the earth's surface and be converted to heat energy (infrared radiation) that does not pass back through the atmosphere as easily as the solar radiation passes in. The result is that heat energy is "trapped" near the earth's surface. This phenomenon is commonly called the greenhouse effect because of an analogy with the glass in a greenhouse. However, the use of the term greenhouse effect to describe these radiative processes is somewhat of a misnomer because the main effect of the glass in a greenhouse is to act as a physical barrier that keeps the warm air inside.

Greenhouse gases include water vapor, CO_2, methane, nitrous oxide, O_3, and several chlorofluorocarbons. The greenhouse gases constitute a small percentage of the earth's atmosphere; however, their collective effect is to keep the temperature of the earth's surface about 60°F warmer, on average, than it would be if no atmosphere existed. Water vapor, a natural component of the atmosphere, is the most abundant greenhouse gas. The second-most abundant greenhouse gas is CO_2, which has increased about 30% in concentration over the last century. Fossil fuel burning is the primary contributor to increasing concentrations of CO_2 (DOE 1989). The increasing CO_2 concentrations may have contributed to a corresponding increase in globally averaged temperature in the lower atmosphere (IPCC 1992).

Because CO_2 is stable in the atmosphere and essentially uniformly mixed throughout the troposphere and stratosphere, the climatic impact does not depend on the geographic location of sources. Therefore, an increase in CO_2 emissions at a specific source is effective in altering CO_2 concentrations only to the extent that it contributes to the global total of fossil fuel burning that increases global CO_2 concentrations. The proposed facilities would increase global CO_2 emissions by about 832,000 tons per year, which is about 0.003% of global CO_2 emissions of 26,713 million tons resulting from fossil fuel combustion in the year 2000. Thus, increases from the proposed facilities would be large in terms of number of tons per year but small in comparison with global totals.

Scoping Concerns

During the scoping process, local residents expressed concern about the potential for odorous emissions (Section 1.5). The potential for odor would most likely result from emissions of hydrogen sulfide (H_2S). For the proposed facilities, however, nearly complete H_2S removal from the shifted synthesis gas, occurring in the acid gas removal plant using a Rectisol unit, would be required by the downstream F-T synthesis process. Remaining concentrations would be as low as 1 to 5 ppm. The captured H_2S would be converted to marketable elemental sulfur in a Claus sulfur recovery unit, a process which should remove approximately 99.99% of the sulfur from the recovered acid gas stream. Thus, odorous emissions of H_2S should not be perceptible. The gas stream exiting the Rectisol unit would be sent to a thermal oxidizer to destroy any trace contaminants prior to being released through a stack to the atmosphere.

As with state-of-the-art integrated gasification combined-cycle facilities, odors from the proposed facilities should not be perceptible due to the similarity in the technologies, including synthesis gas cleanup equipment. In contrast, a slightly different technological process removes about 75% of the sulfur from the gas stream at Sasol's existing coal-to-oil facilities in Secunda, South Africa. The Secunda facilities, built beginning in 1976, have averaged about 3 odor complaints per month over the last year, primarily for H_2S odors. The rate of complaints is higher at Sasol's coal-to-oil facilities in Sasolburg, South Africa, which have been operating since 1955, because the process removes no sulfur.

Air Quality Program Permit No. 54-399-034, issued by the Pennsylvania Department of Environmental Protection for the proposed facilities, states that the proposed facilities may not emit into the atmosphere any malodorous air contaminants from any source in such a manner that the malodors are detectable outside the property.

During the scoping process, local residents also expressed concern about the possibility of emissions from the proposed facilities creating safety issues, such as fog affecting Interstate 81 (Section 1.5). The primary source of any fog generated by the proposed facilities would be the new bank of 12 mechanical-draft cooling towers. About 1,757 gpm of water would evaporate from the cooling towers (Table 2.1.2), which could condense in the atmosphere to form fog under certain meteorological conditions. Interstate 81 is aligned in a west-southwest to east-northeast orientation in a valley about 1 mile to the south of the proposed site on Broad Mountain. Under most meteorological conditions, the atmosphere would be unsaturated and would provide enough mixing so that the water vapor from the cooling towers would not condense. However, during meteorological conditions when the atmosphere is nearly saturated, winds are light, and mixing is very low (i.e., during some early morning hours), condensation is possible, which would appear in the form of a cooling tower plume and/or fog. The fog would probably not affect Interstate 81 due to the distance from the proposed site. No fog resulting from existing Gilberton Power Plant operations has been observed on Interstate 81. However, upon initial operation of the proposed facilities, conditions at the interstate would be monitored and flashing lights to warn motorists of fog would be installed, if warranted.

Finally, a concern was expressed regarding airborne emissions resulting from vehicles traveling over red anti-skid material applied to roads (Section 1.5). This material is bottom ash from the existing Gilberton Power Plant, which is applied to alleviate treacherous road conditions during the winter. Because the bottom ash from the proposed facilities would be in the form of a glass-like slag, which is not suitable as an anti-skid material and would not be applied to the roads, this concern would not become an issue.

4.1.3 Geology and Soils

4.1.3.1 Mineral Resources

The proposed facilities would increase the removal and utilization of the anthracite culm deposited on the landscape of the project area. The facilities' estimated use of 4,711 tons (dry) of beneficiated culm per day (about 1.7 million tons per year) equates to 2.7 times the culm consumption of the existing Gilberton Power Plant. The proposed facilities would increase total culm utilization by 20 to 140% over levels during the period from 1993 to 2002, when anthracite culm utilization in the state ranged from 1.2 to 8.4 million tons per year (Figure 3.3.1).

4.1.3.2 Soils

The proposed facilities would not affect any soil types classified as prime farmland or Pennsylvania farmland of statewide importance. The facilities' use of culm from mine waste dumps in the Mahanoy Creek valley and surrounding region, together with the possible use of project byproduct materials in reclaiming abandoned surface mines and spoil areas, would accelerate the ongoing process of restoring soil productivity in the region.

4.1.3.3 Geologic Hazards

Construction and operation of the proposed facilities would not be expected to increase or decrease the likelihood of ground surface subsidence due to collapse of abandoned underground mine workings. The facilities' use of water from the Gilberton mine pool would lower the average water level in the mine pool, and thus reduce roof support in the abandoned mine workings below Gilberton. However, this would not be expected to increase the likelihood of collapse. Water levels would remain within their current range (Section 3.4.3), and the state of Pennsylvania has not observed any mine roof collapses or other subsidence from several decades of pumping from the mine pools at Gilberton and other locations in the region (Section 3.3.5.1).

Because the proposed main plant would be built over rock units that do not contain coal, the plant would not be affected by subsidence from mining activities. Subsidence could, however, affect product transfer lines and related facilities in the valley of Mahanoy Creek. Abrupt subsidence could rupture product transfer lines and release liquid fuel product into the environment. Environmental consequences of such an event would be similar to those from collision and rupture of a gasoline truck, potentially including fire, explosion, and release of a toxic material into surface waters and soils. Gradual subsidence also could damage product lines and cause leakage, with similar but smaller impacts. The possibility of abrupt subsidence has decreased over time following the closure of underground mines, and will continue to decrease in the future. The potential risks of product line leakage due to gradual subsidence would be reduced by inspecting product lines regularly and repairing any problems.

Although unlikely (as discussed in Section 3.3.5.2), seismic activity also has the potential to cause accidental rupture of product lines and containment systems associated with the proposed facilities. The potential for accidental releases would be reduced by incorporating seismic safety design features into the facilities.

By removing culm waste from the landscape to recover its energy value, the proposed facilities would help to reduce the hazards associated with culm waste, including the potential for culm bank fires. The proposed facilities would not be expected to change either the likelihood of fires or the feasibility and effectiveness of fire control in abandoned underground mines.

4.1.4 Water Resources

4.1.4.1 Surface Water and Mine Pool

Construction

No change in the existing utilization or consumption of surface water or mine pool water would occur during construction of the proposed facilities. No dredge or fill material would be deposited in surface streams.

Water quality could be affected by stormwater runoff from construction sites. However, an erosion and sediment control plan would be developed and implemented for the project, in accordance with NPDES discharge permit PAR-105804R issued by the Schuylkill Conservation District. Standard engineering practices such as silt fencing, straw bales, revegetation of graded areas, and stormwater detention basins would be implemented to control runoff, erosion, and sedimentation. If runoff from the site drained to old strip mining pits on the north or south slopes of Broad Mountain, any sediments would settle out in the pits before the remaining water would seep to the underlying mine pools. If runoff were directed toward tributaries of Mill Creek, it would be routed through detention basins in which sediments would settle out before the water would be released to a stream. Impacts attributable to construction-related runoff would be minimal.

Accidental spills of construction materials such as solvents, paint, caulk, oil, and grease that could contain hazardous substances would be cleaned up in a timely manner and in accordance with a spill prevention, control, and countermeasure plan and best management practices, thus minimizing the potential for overland flow into streams.

Operation

Water Quantity. Operation of the proposed facilities would reduce the water volume in the Gilberton mine pool and the volume of water needed to be pumped from the mine pool and discharged to Mahanoy Creek in order to prevent flooding. These changes would result in reduced stream flow in the creek. During normal operation, the proposed facilities would require about 4,160 gpm from the mine pool, including about 2,740 gpm for cooling water, 1,030 gpm for processing in the main plant, and 390 gpm supplied to the coal beneficiation plant (Table 2.1.2). About 2,290 gpm would be consumed in processing or lost to evaporation, and about 2,020 gpm (including about 150 gpm of stormwater collected from the main plant area) would be discharged as a blend of treated wastewater and uncontaminated water to the tailings pond in the Mahanoy Creek valley and returned to the mine pool (Table 2.1.2).

The net effect on mine pool water flux would be a reduction of 2,140 gpm or 956 million gal per year (assuming operation of the facilities at an 85% capacity factor). This is 38% of the water volume currently pumped to Mahanoy Creek from the Gilberton mine pool to control the mine pool elevation. The state of Pennsylvania would be able to reduce pumping of the mine pool by approximately 38%.

The discharge of untreated mine pool water to Mahanoy Creek would be reduced by the same percentage.

Reductions in pumping from the mine pool to Mahanoy Creek would reduce the amount of water in the stream. Because the stream is not a source of water supply (Section 3.4.4) due to poor water quality, the potential impacts of reduced flow are limited to impacts on in-stream conditions. Averaged over a year, streamflow in Mahanoy Creek would be reduced by 4.1 ft^3/s, which is 43% of the assumed average flow at Girardville (Section 3.4.1). Although measured streamflow at Gilberton and Girardville sometimes is less than 4.1 ft^3/s (Section 3.4.1), the creek would not go dry from receiving less mine pool water. The creek's minimum flows would continue to be maintained by continuous discharges from mine openings in upstream portions of the watershed. Pumping is more frequent during wet weather than dry weather, so discharge from the Gilberton pump is not an important contributor to low flows in the creek. Peak (flood) flows also are unlikely to be affected because the state's pumps normally would not be operated during flood events. Downstream at Ashland, the reduction in flow would be 6.5% of the calculated average streamflow of 63 ft^3/s. Because the only known uses of Mahanoy Creek are in-stream uses, such as receipt of treated sewage, no impacts on water availability would be expected from reductions in pumping.

Water Quality. Project operation would indirectly affect water quality in both Mahanoy Creek and the mine pool system. Treatment and use of mine pool water, generation of liquid process wastes, and treatment of plant wastewater would contribute to modifying the quality of the water that would be discharged back into the mine pool. Reduced operation of the state's pump would reduce the amount of poor quality mine pool water entering the creek, but the dilution volume in the stream would also be reduced.

Although wastewater discharge characteristics and discharge permit requirements for the proposed facilities are not yet available, the treated wastewater discharged to the tailings pond over the mine pool would have near-neutral or slightly alkaline pH. Also, much of the dissolved solids load from the mine pool would be removed, and most organic constituents and nutrients added in plant processes would be removed during wastewater treatment.

Intake water treatment would remove some dissolved substances. Water to be used for cooling water would be treated to reduce iron concentrations to less than 0.5 mg/L using aeration followed by lime treatment, after which the water would be sent to a clarifier and finally filtered. These processes should be effective in removing manganese as well as iron. Both metals would be transferred to water treatment sludge, which would be handled as a solid waste (Section 4.1.8.2). Assuming 99% removal of iron and manganese from the 2,750 gpm of mine pool water obtained for cooling, 1,400 lb of iron and 300 lb of manganese would be removed daily. Water to be used for boiler feedwater and other purposes would receive more extensive treatment (demineralization using ion exchange or reverse osmosis) to remove almost all dissolved substances. Demineralization would produce a concentrated wastewater stream containing dissolved minerals removed from the mine pool water. This concentrated wastewater would be treated in the wastewater treatment units before being discharged (Section 2.1.8.2). Most of the iron, manganese, and other metals would probably be removed from this wastewater stream during processing (these substances would be incorporated into wastewater sludge), but sulfate and other anions could pass untreated into the wastewater discharge.

Discharge of treated effluent to the mine pool by seepage from the tailings pond would be expected to improve mine pool water quality by reducing concentrations of acidity and dissolved metals. Consequently, water pumped from the mine pool to Mahanoy Creek would also improve in quality. Water quality improvements to the creek cannot be quantified due to uncertainty about chemical reactions occurring as water passes from the tailings pond to the mine pool and through the mine pool before discharge to the creek. If the treated effluent were discharged directly to Mahanoy Creek, total manganese loading to the stream would be reduced to below the state's proposed water quality targets for the stream (Section 3.4.1). Loading of acidity and aluminum would also be reduced because water processing in the facilities would remove substantial amounts of these contaminants from the mine pool water, thus aiding in meeting proposed water quality targets for these substances. The potential amount of reduction in acidity and aluminum cannot be determined because data are not available on the concentrations of acidity and aluminum in the mine pool water. Reduced loadings of manganese, acidity, aluminum, and iron would increase the potential for Mahanoy Creek to provide suitable habitat for aquatic life. Concentrations of sulfate in the stream could increase, but this increase would not affect attainment of water quality criteria because no water quality criteria exist for sulfate in waters designated for use as aquatic habitat. Water quality in Mahanoy Creek would experience less actual improvement because effluents would not be discharged directly to the creek, but would instead be discharged to the tailings pond and would pass through the mine pool before being pumped into the creek. Water chemistry would be altered by mixing with mine pool water and by chemical reactions with soil and rock as the water passes from the tailings pond to the mine pool and through the mine pool. Metals are relatively insoluble in water at neutral or alkaline pH, but reactions with pyrite and other minerals in the soil and rock would be likely to deplete the alkalinity in the water, increasing its acidity and allowing some dissolution of metals to continue.

Although the facilities' wastewater treatment system would be designed to treat organic residues (Section 2.1.6.2), effluents from the facilities could contain residual amounts of organic compounds found in process wastewaters. Toxic and carcinogenic substances, including cyanides and polycyclic aromatic hydrocarbons (PAHs) such as pyrene, might be present in low concentrations (SAIC 2002). Any adverse effects of these substances on Mahanoy Creek water quality would probably be undetectable because of the overriding impacts of acid mine drainage, but their presence could add to the challenges involved in restoring stream functions. Human exposure to these substances would be unlikely to occur in the site vicinity because people do not use the stream water. Downstream impacts would be reduced by natural degradation (for example, of cyanides) and dilution.

4.1.4.2 Groundwater

Construction and operation of the proposed facilities would not change groundwater use on Broad Mountain. Water for the facilities would be drawn from the mine pool, not from sources on Broad Mountain. However, the facilities' development could affect groundwater availability by increasing the area of impervious surface, thus reducing groundwater recharge to the aquifers on Broad Mountain. Water that previously would infiltrate the soil to enter the groundwater under Broad Mountain would instead become stormwater runoff and would be discharged to streams or strip mining pits. Thus, this water would not be available to recharge the aquifers on Broad Mountain.

Assuming that the project would prevent groundwater recharge of 15 in. per year (Section 3.4) over 50 acres of the 75-acre site, the reduction in recharge would be 2.7 million ft^3 per year (39 gpm or almost 56,000 gal per day). Because the onsite septic system for disposal of sanitary wastewater from the proposed facilities would replace some of this recharge by discharging an estimated 4 gpm into the aquifer, the net loss in recharge would be 35 gpm or 50,000 gal per day. For comparison, this is about 60% of the combined volume of groundwater supplied by the wells serving the Gilberton Power Plant and the Morea water system (Section 3.4.4). This reduced recharge should not adversely affect users of the Morea water system. Recharge from areas closer to the Morea well (i.e., within a 1,000-ft radius) is estimated to be almost 4 million ft^3 per year (56 gpm or 80,000 gal per day), which is more than enough to meet the needs of the Morea water system (20,500 gal per day).

The wells serving the Gilberton Power Plant are closer to the proposed main plant site than the Morea well is to the main plant site, and thus would be more likely to experience any impacts from reduced recharge. If the reduced recharge affected the availability of groundwater to meet the needs of the existing power plant, the facilities' owners would address the situation by establishing a connection with one of the public water suppliers identified in Section 3.4.4 (Gerald Choi, Nexant, Inc., personal communication to Ellen Smith, ORNL, June 21, 2005). Because other wells in the area are farther from the proposed facilities than the Morea well is from the proposed facilities, they also should not be affected by reduced recharge.

Most potential impacts to groundwater quality on Broad Mountain would be avoided by implementing standard engineering practices, including collection of potentially contaminated runoff and cleaning up accidental spills in a timely manner. The proposed septic system for sanitary wastewater disposal would discharge effluents to the aquifer, but these effluents should not adversely affect groundwater quality. The septic system would be designed and operated in accordance with permitting requirements and would only receive wastewaters like those generated by households. Silty sand soils, such as the soils found on Broad Mountain, are usually effective in filtering and attenuating contaminants in effluents from properly designed and maintained septic systems. Dilution of the relatively small volume of septic effluent by the much larger volume of natural groundwater recharge would minimize the impacts of any contaminants that do reach groundwater.

4.1.5 Floodplains and Wetlands

4.1.5.1 Floodplains

The main plant would be located at an elevation well above the Federal Emergency Management Agency's delineated 100- and 500-year floodplains (Section 3.5.1). A new culm beneficiation plant or expansion of the existing facility in the adjacent valley to the north of the main plant area would also lie above the elevation of the 100- and 500-year floodplains. The following project ancillary facilities, however, would cross the 100- and 500-year floodplains of Mahanoy Creek: (1) two product rundown pipelines to a railroad siding, (2) an expansion of the coal conveyor from the culm beneficiation plant, and (3) a pipeline for mine pool water. These structures would be placed atop an existing trestle at an elevation above the level of the 100- and 500-year floods (FEMA 1983, 1986). No new construction within the floodplain would be required.

4.1.5.2 Wetlands

Construction and operation of the proposed facilities would have no adverse effects on wetlands because none are present on the project site. Runoff and spills from the site would be controlled by standard construction engineering practices and spill control procedures (Section 4.1.4).

4.1.6 Ecological Resources

4.1.6.1 Terrestrial Ecology

Construction

Approximately 75 acres of deciduous forest would be permanently lost to construct the main plant. An additional 1.5 acres, which would be cleared for ancillary structures, would revegetate to some extent. Loss of this habitat, increased human activity in the main plant area, increased traffic on local roads, and noise would be the most important factors that would affect wildlife species.

The presence of construction crews and increased traffic would cause some wildlife species to avoid areas next to the construction site during the 30-month construction period. Wildlife inhabiting the area rely on native trees, shrubs, and groundcover for food and shelter and would be affected by vegetation clearing. Burrowing and less mobile species such as amphibians, some reptiles, and some small mammals could be adversely affected during vegetation clearing and grading and other site preparation activities. The loss of deciduous forest during construction would displace some small mammals and songbirds from the construction areas, but would not be expected to eliminate any wildlife species from Broad Mountain because similar habitat is relatively common along, and on both sides of, the ridge. Clearing for support facilities, i.e., product rundown lines, mine pool water source and return lines, and natural gas line, would create additional forest edge and introduce habitat diversity as these areas partially revegetated. This would tend to benefit edge-related wildlife species, while displacing forest-related species from the new habitat.

Construction would temporarily modify the quality of the surrounding habitat in the project area by the creation of noise. Noise levels at a distance of 50 ft typically associated with earthmoving equipment range from 73 to 96 dB(A), and 82 dB(A) for chain saws (FHWA 2005; Revelle and Revelle 1974). Published results from several studies indicate that small mammals and birds might be adversely affected by the maximum noise levels produced by construction equipment (Luz and Smith 1976; Brattstrom and Gondello 1983). White-tailed deer and other skittish larger mammals would not use the areas near the proposed site during construction activities because of noise and the presence of workers. No long-term impacts on the hearing ability of wildlife species would be expected from construction-generated noise.

Some unavoidable impacts on wildlife would occur as a result of increased vehicular traffic. Construction traffic along the new access road would increase the potential for roadkills for animals such as turkeys, squirrels, and chipmunks.

Birds of prey passing through, or possibly otherwise using the area, probably would not be adversely affected by the loss of prey base that would be associated with the clearing of the total of 76.5 acres of vegetation, due to the existence of much similar habitat nearby. However, their foraging in areas next to construction sites might be reduced due to increased human activity.

To mitigate impacts of construction to ecological resources, forest clearing would be minimized to the extent practicable by clearing no more land than absolutely necessary for construction. Best management practices (BMPs) for sediment and erosion control, including use of silt fence, straw bale structures, and geotextile materials would be employed where appropriate. Excavated areas surrounding the proposed facilities would be reseeded following construction, and where practicable, some areas would be allowed to revert to forest.

Operation

The impacts on wildlife and vegetation from air emissions due to routine operations should be minor. For the criteria air pollutants SO_2, NO_2, PM-10, and CO, modeled estimates of increases in ground-level concentrations due to project emissions are generally low (Table 4.1.1), and actual degradation of air quality should be less than the amounts predicted (Section 4.1.2.2). Although no estimates of project-related hazardous air pollutants and trace elements are currently available, the cleaning of synthesis gas would result in a high percentage of removal (Section 4.1.2.2). Trace elements and organic compounds would be released at low concentrations and would be diluted further by atmospheric dispersion over a large geographic area, resulting in deposition amounts that should be below levels known to be harmful to wildlife and vegetation or to affect ecosystems through bio-uptake and biomagnification in the food chain (Will and Suter 1995; Suter and Tsao 1996; Jones, Suter, and Hull 1997; Sample, Opresko, and Suter 1996).

The culm that would be used as feedstock for the proposed facilities would be obtained from culm banks created during previous anthracite mining in the region. Pennsylvania law (25 Pa. Code §88.181.243) requires that remined culm banks be graded to minimize erosion and that vegetation be successfully established for at least 5 years. Consequently, operation of the proposed facilities would result in reclamation of anthracite mined lands in the adjacent valley and the region. Actively remining previously abandoned surface or deep mines is encouraged by the Pennsylvania Department of Environmental Protection (2004c) as the most efficient way to reclaim abandoned mine lands at no cost to taxpayers. Although a reasonable estimate cannot be made of the amount of land that would be reclaimed during the 3-year demonstration period (because of uncertainty in the selection of culm banks to be used and variations in bank dimensions), approximately 1,000 acres would be reclaimed over the entire 26-year operating life of the proposed facilities. Over the long term, the terrestrial habitat created on reclaimed lands would offset the 76.5 acres of deciduous forest that would be cleared for the proposed facilities.

4.1.6.2 Aquatic Ecology

Impacts to aquatic habitats and fish from construction and operation of the proposed facilities would be minor to negligible. No surface waters are on or in the immediate vicinity of the proposed project site. Best management practices (BMPs) for sediment and erosion control, including use of silt fence, straw bale structures, and geotextile materials would be employed during construction. Accidental spills of construction materials such as solvents, paints, oil, grease, and hazardous substances would be controlled in accordance with an appropriate spill, prevention, control, and countermeasure plan. Thus, impacts to the closest surface water body, a tailings pond along Mahanoy Creek more than 0.25 mile from the proposed plant site, would be unlikely.

Operational water for the proposed facilities would be withdrawn from the mine pool. Wastewater, including any contaminated runoff from the project site, would be handled using a combination of stormwater retention, wastewater treatment, oil recovery, biological treatment and solids removal, and disposal. Wastewater treatments would include equalization, API separator treatment for oil removal and recovery, dissolved air flotation for additional oil removal, and biological treatment. Spills at the project site and ancillary structures such as the product rundown lines would be controlled consistent with a spill control plan. Product rundown lines would be designed to withstand flooding and earth slides. Potential for spill-related liquid effluents to reach surface water bodies would be low.

Wastewater would be treated to meet effluent limits specified in a Pennsylvania Department of Environmental Protection NPDES permit, and would be blended with both treated and uncontaminated stormwater prior to discharge to the tailings pond in the valley. The water in the tailings pond would percolate back to the mine pool, which is pumped as necessary by the Pennsylvania Department of Environmental Protection and discharged to Mahanoy Creek. Due to consumptive use of water by the proposed facilities, less state pumping of mine pool water would be required and Mahanoy Creek stream-flow would be reduced (Section 4.1.4.1). Wastewater quality would be monitored to ensure compliance with permitted effluent limits. The treated water discharged to the tailings pond would be of higher quality (i.e., less acidic with lower concentrations of dissolved metals) than the mine pool water. The effect of returning some of this water on the water quality and aquatic ecology of Mahanoy Creek, which is substantially altered due to acid mine drainage, should be negligible to slightly beneficial.

Land reclamation following culm bank removal for project feedstock would be expected to reduce acid mine drainage and pollution of streams and rivers in the anthracite coal region (PDEP 2004c). Removal of culm banks followed by grading and vegetation establishment would act to reduce infiltration of rainwater and snowmelt into pyrite-bearing strata, thus reducing acid mine drainage (Klemow 2000; Hawkins 1995).

4.1.6.3 Threatened and Endangered Species

Because the proposed facilities would not be located within an area that provides habitat for any endangered, threatened, candidate, special concern, or rare species of bird, mammal, reptile, amphibian, fish, aquatic invertebrate, or plant recognized by the state or federal government, except for occasional transient individuals (Section 3.6.3), it is unlikely that any such species would be affected by project construction or operations.

In compliance with Section 7 of the Endangered Species Act of 1973, as amended, DOE requested consultation with the U.S. Fish and Wildlife Service regarding potential impacts of the proposed facilities on threatened and endangered species. The U.S. Fish and Wildlife Service response indicated that, with the exception of occasional transient individuals, no federally-listed or proposed threatened or endangered species are known to occur within the project impact area, and that no biological assessment or further consultation under the Endangered Species Act would be required (Appendix A).

4.1.6.4 Biodiversity

About 75 acres of second-growth deciduous forest typical to the region would be lost due to clearing and construction on the project site. Given the predominance of this forest type in the region it is unlikely that unique genetic information, or rare species or ecosystem components, would be lost. Thus, discernable impacts to biodiversity would not be expected.

4.1.7 Social and Economic Resources

The social and economic impacts of the proposed project would be most noticeable during the 30-month construction period, when an average of 516 workers would be on the site. These impacts would peak during a 6-month period when 1,000 workers would be on the site. The project would also have short-term impacts from employment of 250 workers during the 36-month demonstration period immediately following construction, and long-term impacts from employment of 150 workers for operations after completion of the demonstration (Sullivan 1997). This assessment focuses primarily on the social and economic impacts of project construction and long-term operations because construction would have the largest impacts and operations would have the longest-lasting impacts. The assessment focuses less on the social and economic impacts of the 36-month demonstration period because they would be smaller than those of the construction period and of shorter duration than those of the operations period.

In addition to the direct jobs that would be created by project construction and operations, a number of indirect and induced jobs would be created. Indirect jobs are those created by businesses that provide goods and services essential to the construction and operation of a project. Induced jobs are those created "by the spending of the wages and salaries of the direct and indirect employees on items such as food, housing, transportation, and medical services" (NEPaA 2004b).

Using calculations based on the Northeastern Pennsylvania Alliance *Economic Impact Model*, the average number of direct jobs during project construction (516) could create as many as 181 indirect jobs and 175 induced jobs, for a total of 872 jobs in Schuylkill County (NEPaA 2004c). The peak number of direct jobs during construction (1,000) could create as many as 351 indirect jobs and 338 induced jobs, for a total of 1,689 jobs in Schuylkill County (NEPaA 2004c).

Similarly, during long-term operation of the proposed facilities, the 150 direct jobs could create as many as 115 indirect jobs and 173 induced jobs in Schuylkill County (NEPaA 2004c). Thus, long-term project operations could account for as many as 438 total jobs in Schuylkill County. The employment multipliers for operational jobs are larger than those for construction jobs because the operating period is much longer than the construction period and, therefore, would likely result in more workers permanently relocating to the area.

The following subsections discuss the potential socioeconomic impacts of the proposed project, particularly those associated with direct, indirect, and induced employment during project construction and operations.

4.1.7.1 Population

Because the proposed facilities would be located within a 1-hour drive of some large labor markets with existing labor organizations (i.e., Reading, Allentown, and Wilkes-Barre), a minimal number of workers would be expected to move to the project locale during construction and operation. Therefore, this analysis assumes that most of the construction and operations workers already reside in the project region and would commute daily from their homes to the project site. Although workers would be unlikely to relocate from outside the project region, this analysis assumes as a conservative estimate that 10% of the peak construction work force (100 workers) and 60% of the operations work force (90 workers) would relocate. The analysis assumes a lower percentage of relocating workers for construction than for operations because the construction period would last only 30 months (i.e., the shorter the work period, the less likely that workers would relocate).

Past experience with large, multi-year power plant construction and refurbishment projects indicates that approximately 60% of the in-migrating work force is accompanied by family, while the remaining 40% is not (NRC 1996). However, for this relatively small, 30-month construction project, a more reasonable assumption is that only 40% of the construction workers relocating to the area (40 workers) would be accompanied by family. This analysis assumes that a higher percentage of the operational workers relocating to the area (75% or 68 workers) would be accompanied by family because the facilities' operating period would be much longer than the construction period.

Assuming that 60 construction workers would relocate without families and that 40 construction workers would relocate with families, and assuming an average family household size of 2.48 persons for Pennsylvania (U.S. Census Bureau 2004b), the permanent population in the project area (Schuylkill County) would increase by about 160 as a result of direct construction employment. This population growth would represent 0.11% of Schuylkill County's population in 2000.

Similarly, assuming that 68 operations workers would relocate with families and that 22 operations workers would relocate without families, and assuming an average family household size of 2.48 persons, the permanent population in the project area would increase by about 190 as a result of direct operations employment. This population growth would represent 0.13% of Schuylkill County's population in 2000.

The indirect and induced jobs that could be created would be less specialized than the direct construction and operations jobs, and would be even more likely to be filled by existing area residents. Accordingly, this analysis assumes that none of the indirect or induced work force would relocate to the project area during project construction or operations.

The potential impacts of project-related population growth are discussed below in Sections 4.1.7.3 (Housing), 4.1.7.4 (Water and Wastewater Services), and 4.1.7.5 (Public Services).

4.1.7.2 Employment and Income

The 1,689 total jobs (1,000 direct, 351 indirect, and 338 induced) that could be created during the peak construction period (Section 4.1.9) would represent 2.5% of the total labor force in Schuylkill County in 2000. Similarly, the 438 total new jobs (150 direct, 115 indirect, and 173 induced) that could be created during project operations would represent 0.6% of the county's total labor force. Because most of the direct, indirect, and induced jobs during construction and operations would be filled by workers who currently reside within a 1-hour driving distance of the proposed facilities, project construction would have a short-term positive effect on employment in the region, and project operations would have a long-term positive effect on employment in the region.

Because most of the construction and operations work forces would reside in the project region, project wages would have a positive effect on total and per capita income in Schuylkill County. Based on the types and numbers of occupations that would make up the construction work force and the average annual salaries for those occupations in Schuylkill County (PDLI 2003), the total direct payroll during the 6-month peak construction period would be close to $20 million. The total direct payroll for the entire 30-month construction period would be at least twice as large as this $20 million figure. Further, assuming only the current minimum wage in Pennsylvania of $5.15 per hour (U.S. Department of Labor 2004) and 2,000 hours per work-year, the total payroll generated by the indirect and induced jobs (356) over the 30-month construction period would be over $9 million.

Similarly, assuming that 150 employees would make up the operations work force, and that the average annual salary for a "power plant operator" in Schuylkill County is $40,014 (PDLI 2003), the annual direct payroll during project operations would be at least $6 million. Further, assuming only the current minimum wage in Pennsylvania ($5.15 per hour) and 2,000 hours per work-year, the annual payroll generated by the indirect and induced jobs (288) during project operations would be nearly $3 million.

Overall, construction of the proposed facilities would have short-term positive effects on employment and income in the region. Project operations would also have positive effects on employment and income and, provided that the demonstration were successful (Section 5), these effects would last longer than the effects of construction. The project's positive effects on employment and income would contribute to the region's economic viability.

4.1.7.3 Housing

Because most of the direct, indirect, and induced jobs during project construction and operations would be filled by workers who currently reside within a 1-hour driving distance of the proposed facilities, demand for housing in Schuylkill County would not increase appreciably. Housing for the 100 new construction-related households (i.e., the workers relocating with and without families) assumed as an upper bound in this analysis would represent 1.4% of the 7,276 vacant housing units in Schuylkill County in 2000. Similarly, the 90 new operations-related households would represent 1.2% of the county's vacant housing in 2000. These levels of increased demand would not be likely to have an adverse effect on the availability or cost of housing in Schuylkill County, particularly given the county's population decline since 1990.

Because the relatively small increase in demand for housing associated with the proposed project would not likely affect housing availability or cost in Schuylkill County, it also would not likely increase residential property values. Conversely, because the proposed facilities would be located between an existing power plant and a correctional institution, project construction and operations would not likely decrease residential property values in the county.

4.1.7.4 Water and Wastewater Services

Because most of the direct, indirect, and induced jobs during project construction and operations would be filled by workers who currently reside within a 1-hour driving distance of the proposed facilities, demand for water and wastewater services in Schuylkill County would not increase appreciably. Mahanoy Township Authority and the Schuylkill County Municipal Authority have abundant water supplies (Section 3.7.4), which could easily meet the additional demand from 100 new construction-related households and 90 new operations-related households. Because of planned upgrades by the Greater Pottsville Area Sewer Authority, the additional demand from the new households would not exacerbate existing problems with the provision of wastewater services in Pottsville (Section 3.7.4).

4.1.7.5 Public Services

Police Protection

As discussed in Section 4.1.7.1, population growth associated with construction and operation of the proposed facilities would be minimal, representing only about 0.1% of Schuylkill County's population in 2000. Given such a small population increase, particularly in the context of an ongoing population decrease in Schuylkill County (Section 3.7.1), construction and operation of the facilities would not create an additional need for police protection. In the unlikely event of an accident associated with plant operations or the shipment of materials, additional police resources would probably be required, most likely from Pottsville and the Pennsylvania state police.

Fire Protection and Emergency Medical Services

As with police protection, the relatively small population increase and housing demand associated with construction and operation of the proposed facilities would not create an additional need for fire protection or emergency medical services. In the unlikely event of an accident associated with plant operations or the shipment of materials, additional fire protection and emergency medical services would probably be required, most likely from Pottsville and other parts of Schuylkill County.

Schools

Because population growth associated with construction and operation of the proposed facilities would be minimal, little (if any) effect on local schools would be experienced. This outcome is reinforced by Schuylkill County projections, which indicate that by 2013 the Mahanoy Area School District's total enrollment will decrease by more than 39% for all grade levels, and the Pottsville Area School District's enrollment will decrease by 5% for kindergarten–8th grade and by 23% for 9th–12th grade (Section 3.7.5.3).

Health Care

Given the small population growth associated with construction and operation of the proposed facilities, particularly in the context of an ongoing population decrease in Schuylkill County (Section 3.7.1), construction and operation of the facilities would not create an additional need for health care facilities. In the unlikely event of an accident associated with plant operations or the shipment of materials, the local health care facilities could be strained, and some accident victims might need to be transported out of the immediate area for treatment. The extent of the impact on local health care facilities and the need to transport patients elsewhere would depend on the type and size of the accident.

4.1.7.6 Local Government Revenues

The proposed facilities would be located in one of Pennsylvania's designated Keystone Opportunity Zones, which are geographical areas that receive local and state approval for tax abatements for the purpose of stimulating economic development. Because of this designation, local real estate taxes (to Schuylkill County, Mahanoy Township, and the Mahanoy Area School District) for the proposed project site and taxable improvements would not be due until January 2014. Using 2003 real estate tax rates and a projected assessed value on land and improvements, the facilities' annual real estate tax payments would be approximately $73,000 starting in 2014.

4.1.7.7 Environmental Justice

As discussed in Section 3.7.7, Schuylkill County and eight of the nine census tracts within 3 miles of the proposed facilities have lower minority percentages than the United States and Pennsylvania. For Census Tract 7, however, significant minority populations reside at the Mahanoy and Frackville State Correctional Institutions. The Mahanoy State Correctional Institution is immediately east of the proposed main plant site, and its minority inmate population represents an “environmental justice” population to which the adverse impacts of constructing and operating the proposed facilities could be distributed disproportionately. Serious air quality and health impacts to this population would not be expected, however, because (1) air quality impacts would not be appreciable with the exception of temporary fugitive dust during construction, and (2) the Mahanoy State Correctional Institution is a sealed facility in which inmates and employees would not be exposed to outside air except during periods of outdoor activity (Section 4.1.2.1).

Schuylkill County's population percentage below the poverty level is lower than that of Pennsylvania and the United States. However, two census tracts near the site of the proposed facilities have relatively high poverty rates (Table 3.7.5). Census Tracts 5 and 6 have poverty rates that exceed those of both Pennsylvania and the United States. Therefore, the relatively large populations below the poverty level in Census Tracts 5 and 6 represent “environmental justice” populations to which the adverse impacts of constructing and operating the proposed facilities could be distributed disproportionately. Serious air quality, water quality, and health impacts to these populations would not be expected, however, as discussed in Sections 4.1.2, 4.1.4, and 4.1.9. The proposed project could have positive economic effects for these populations by creating employment and income in the region (Section 4.1.7.2).

4.1.7.8 Transportation

Roads

All of the 1,000 workers during the 6-month peak construction period would access the project site from State Route 1008 (Morea Road). Most of these workers would access State Route 1008 from its intersection with State Route 61 in the town of Frackville. For this assessment, it is assumed that the construction workers would commute to and from the project site each day, and that the average vehicle would carry two workers. Thus, as an upper bound, about 1,000 additional vehicle trips (500 to the site and 500 from the site) would be generated each day during the peak construction period.

Average daily traffic (ADT) on State Route 61 in Frackville is 10,186 vehicles, and ADT on State Route 1008 near the Gilberton Power Plant is 4,486 vehicles (Section 3.7.8.1). The 1,000 additional daily vehicle trips for workers during the peak construction period would represent increases of 10% and 22% over existing traffic on State Route 61 and State Route 1008, respectively. Increases of this size on State Route 61 and State Route 1008 would likely cause traffic congestion and have an appreciable impact on traffic flow and safety during morning and afternoon commutes (Dave Gruber, Pennsylvania Department of Transportation District 5, personal communication to James W.

Saulsbury, ORNL, May 26, 2004). In addition to these construction workers' vehicles, the number of construction delivery trucks accessing the project site from State Route 61 and State Route 1008 would increase. Because most of this construction-related traffic would occur during peak morning and afternoon drive times, impacts to traffic flow and safety on State Route 61 and State Route 1008 would be particularly acute. WMPI personnel have committed to contacting the Pennsylvania Department of Transportation to discuss potential mitigation options, including signaling, road widening, and scheduling work hours and/or deliveries to avoid periods of heavy traffic.

During the demonstration and long-term project operations, all of the 250 and 150 workers, respectively, would access the facilities from State Route 1008 (primarily via State Route 61 in Frackville). It is assumed for this assessment that each vehicle would carry one operations worker. Thus, as an upper bound, about 500 additional vehicle trips (250 to the site and 250 from the site) would result each day from workers commuting during the demonstration, while about 300 additional vehicle trips (150 to the site and 150 from the site) would result each day from workers commuting during long-term operations. In addition, approximately 104 truck trips per day (52 to the site and 52 from the site) would deliver culm to the site, 40 truck trips per day (20 to the site and 20 from the site) would bring limestone, and 22 truck trips per day (11 to the site and 11 from the site) would transport waste material to an offsite landfill. Although liquid fuels produced by the proposed facilities are planned to be shipped from the facilities solely by rail, if the fuels should be shipped by truck, about 80 vehicle trips would be required daily (40 to the site and 40 from the site). The impacts of operations-related traffic would be less severe than those of construction-related traffic but would be more long lasting. WMPI personnel have committed to contacting the Pennsylvania Department of Transportation to discuss potential mitigation options, including signaling, road widening, and scheduling work hours and/or deliveries to avoid periods of heavy traffic.

Railways

The proposed facilities would affect the local rail system because the project's liquid fuels would be shipped by rail. Rail transport would require the construction of product pipelines to transport materials to the nearest railroad siding in Gilberton, about 1 mile from the main plant area, and construction of storage and loading facilities capable of filling approximately eight tank car loads of product per day. Filled tank cars would be stored on a siding. Once a week, a new supply of empty tank cars would be delivered, and a train of filled tank cars would be assembled and moved off the site. Rail shipments of this magnitude would not have adverse impacts on the local rail system (James G. Raffa, Vice President, Traffic, Reading Blue Mountain & Northern Railroad Company, personal communication to James W. Saulsbury, ORNL, September 9, 2004). Potential accidents associated with transport of liquid fuels are discussed in Section 4.1.9.1.

4.1.7.9 Cultural Resources

In compliance with Section 106 of the National Historic Preservation Act of 1966, as amended, DOE has consulted with the Pennsylvania SHPO regarding a determination of the potential for impacts associated with the proposed facilities on any historic resources that may be listed in or eligible for the *National Register of Historic Places* or that may have local importance. Impacts from construction and operation of the facilities would not be likely because the SHPO has stated that no historic or archaeological properties are listed or eligible for listing on the *National Register* in the project area (Appendix B). The SHPO has further stated that DOE's responsibility for consultation is complete. However, the SHPO would be notified if any historic or archaeological properties located at or near the project site are detected.

4.1.8 Waste Management

4.1.8.1 Construction

Initial site grading would include land clearing, grubbing, stripping, excavation, and placement of fill to establish rough grading elevations. Excavated soil would be used onsite for fill. Topsoil and other soil containing organic material would be stockpiled on the site and used in final grading. Some timber could be salvaged and sold for pulpwood or firewood, but the majority of the removed vegetation, including tree stumps, would be managed as waste. Open burning on the site would minimize the labor and transportation required to dispose of this material, but would have short-term impacts in the surrounding area due to smoke, odors, and increased airborne particles (Section 4.1.2.1). To minimize the potential for fire to spread to nearby vegetation, burning would not be scheduled during drought conditions in which advisories have been issued by the Pennsylvania Department of Environmental Protection. Alternatively, this material could be taken to a commercial composting facility for recycling. Composting facilities that accept land-clearing debris are located in Robesonia (Berks County), Bethlehem, and the Philadelphia area (Section 3.8).

Waste from construction of the proposed facilities would include excess materials, metal scraps, and pallets, crates, and other packing materials. Excess supplies of new materials would be returned to vendors, retained for future use, or transferred in settlement with subcontractors (who could retain the items for use in future projects). Surplus paint and other consumables, partial spools of electrical cable, and similar leftover materials would also be retained for possible future use in maintenance, repairs, and modifications (Section 2.1.6.3).

Metal scrap not suitable for future use in the facilities would be collected in dumpsters for resale to scrap dealers or recyclers. The volume of metal scrap would be no more than one dumpster per month during the period of peak scrap generation, with less generated during the first six months and last three months of construction (Section 2.1.6.3).

Packaging materials and nonmetal components broken during installation would be collected in dumpsters for offsite disposal. The largest volume of solid waste requiring disposal would be packaging material, including wooden pallets and crates, support cradles used for shipping of large vessels and heavy components, and cardboard and plastic packaging. The rate of generation for packaging waste would be up to two truckloads per month (estimated to be about 18 cubic yards or 18 tons per month) during construction (Section 2.1.6.3). The volume of broken nonmetal components would be much smaller. The quantity and character of other wastes would be typical of any work site. Office waste paper would be collected for recycling, and miscellaneous work site waste (such as garbage from workers' meals) would be collected for offsite disposal.

The commercially available municipal solid waste landfills in the region (Section 3.8) should have ample capacity to receive and dispose of project construction wastes. Because project construction waste quantities would be small in comparison with the landfill capacities and waste quantities routinely handled at these sites, management of these wastes should have negligible impact.

During construction, no hazardous waste generation would be anticipated (Section 2.1.6.3).

4.1.8.2 Operation

Solid Waste

Solid wastes and byproducts generated by the operation of the proposed facilities would include gasifier slag, fine solids, elemental sulfur, and sludges from water and wastewater treatment (Section 2.1.6.3).

Slag generated by the gasifier would be a vitrified (glass) silicate material formed when noncombustible solids found in coal and culm are heated past the melting point and then cooled rapidly. No organic compounds would be expected in this material. Slag, which would be black in color and granular (sand-like) in form, would be generated at a rate of 1,600 tons per day (wet weight) or 800 tons per day (dry weight). One day's slag production would cover an acre of land to a depth of about 1 ft.

Commercial uses would be sought for the gasifier slag, which is projected to have low bulk density, high shear strength, and good drainage and filtering characteristics. Several potential uses have been identified for this material, including lightweight construction aggregate, asphalt roofing shingle granules, blasting grit, and pipe bedding material (SAIC 2002). However, markets for this material have not yet been established. Any slag that is not used commercially would be used as fill material for surface mine reclamation at and near sites where culm would be obtained (Section 2.1.6.3).

Contaminants potentially can leach into groundwater or surface water when solid byproducts are used in the environment. Requirements of the Pennsylvania residual waste management regulations (25 Pennsylvania Code Chapter 287) are intended to prevent or reduce the potential for adverse impacts from leaching of wastes (Strock 1996). Coal combustion residues must be characterized for chemical composition and to verify that they meet regulatory criteria for leachability. Materials must be retested periodically to demonstrate that they continue to meet the criteria. Coal combustion residues may be used as fill only in coal mining areas (active or abandoned) or coal refuse disposal sites. Placement must be at least 8 ft above the regional water table, but the regulations provide for exemptions (e.g., placement in mine pools) upon demonstration that no groundwater contamination would occur. Compliance with these regulations would minimize the potential for adverse impacts to water quality from management of the slag residue.

Characterization of coal ash from the existing Gilberton Power Plant provides a basis for predicting the characteristics and leaching behavior of coarse slag from the proposed facilities. Because both facilities would use culm from the same sources, the slag and ash should have similar chemical composition, but the vitrified gasifer slag would have different physical and mechanical properties and would be less leachable than the ash, which is formed at lower temperatures. Table 4.1.2 presents results of chemical analysis and leachability testing of Gilberton Power Plant ash. Leachability was tested using the Synthetic Precipitation Leaching Procedure (SPLP), which simulates the potential effects of leaching under acidic conditions typical of rainfall in the eastern United States. Testing found the ash to be highly alkaline (leachate pH was 10.48), a desirable characteristic for reclamation of acidic mine wastes. All dissolved constituents in the ash leachate were below maximum acceptable concentrations for beneficial use, as specified under Pennsylvania residual waste management regulations. Ash leachate concentrations of all constituents except aluminum, antimony, arsenic, lead, and sulfate were also below the applicable drinking water Maximum Contaminant Level Goal (MCLG) or primary or secondary drinking water standards (for substances without MCLGs). Due to the physical differences between slag and ash, leaching of slag from the proposed facilities would be expected to result in much lower contaminant concentrations. Thus, the risk of adverse impacts to groundwater quality from using this material in mine reclamation would be negligible. However, the relatively inert slag also would have less value as a source of alkalinity for acidic mine reclamation.

About 200 tons of fine solids (dry basis) would be generated each day. Some of this material might be captured and returned to the gasifier for energy recovery (SAIC 2002), but the majority would be used in a permitted ash disposal area on WMPI land as part of mine reclamation (Section 2.1.6.3), subject to the same residual waste regulations that would govern management of the slag. The fine solids would not be as chemically inert as either slag or power plant bottom ash and would contain 11% carbon (dry basis), as either unburned carbon or other coal-derived organic constituents. The potential for impacts to water quality from using this material in mine reclamation would be larger than from similar use of the slag, but compliance with the residual waste regulations would minimize the potential for adverse impacts to water quality. Although it is expected that the majority of fine solids would be applied on land as part of mine reclamation, this assessment also considers the possibility that the material would not meet regulatory criteria for use in mine reclamation, and therefore would be taken for disposal in a commercial landfill, such as the facilities identified in Section 3.8.

Table 4.1.2. Chemical analysis of Gilberton Power Plant coal ash and Synthetic Precipitation Leaching Procedure (SPLP) leachate

Constituent	Ash concentration (mg/kg dry weight)	Leachate concentration (mg/L)	Maximum acceptable leachate concentration (mg/L)[a]	Applicable drinking water criterion (mg/L)
Aluminum	36,300	3.14	5.0	0.2[b]
Antimony	4	<0.04	0.15	0.006[c]
Arsenic	18.1	0.045	1.25	0.05[d]
Barium	296	0.04	50	2[c]
Boron	61	0.06	31.5	—[e]
Cadmium	0.9	<0.005	0.13	0.005[c]
Chromium	57	0.08	2.5	0.1[c]
Copper	51	0.02	32.5	1.3[c]
Iron	24,300	0.21	7.5	0.3[b]
Lead	58	0.05	1.25	0.005[f]
Manganese	120	<0.005	1.25	0.05[b]
Mercury	0.2	<0.0002	0.05	0.002[c]
Molybdenum	<1.0	0.05	4.38	—[e]
Nickel	21	<0.01	2.5	—[e]
Selenium	8.5	0.018	1.0	0.05[c]
Zinc	37	0.05	125	5[b]
Chloride	NA[g]	1.78	2,500	250[b]
Sulfate	NA[g]	502	2,500	250[b]

Source: WMPI PTY, LLC. Analysis reported by Hawk Mountain Labs, Inc., West Hazleton, PA, December 12, 2003

[a]Pennsylvania residual waste management regulations, (25 Pennsylvania Code Chapter 287). For most dissolved metals, maximum acceptable concentrations were set at 25 times the applicable drinking water Maximum Contaminant Level Goal (MCLG; a health-based criterion established by federal and state drinking water regulations) or secondary drinking water standard. For chloride and sulfate, the maximum concentrations are 10 times the secondary drinking water standard.

[b]Secondary drinking water standard.

[c]MCLG

[d]Primary standard; will change to 0.01 mg/L in January 2006 (no MCLG).

[e]Not currently regulated. For nickel, MCLG and primary standard were set at 0.1 mg/L until remanded in 1995.

[f]Pennsylvania primary drinking water standard (no MCLG).

[g]NA = Not analyzed

Sludges from treatment of raw water and wastewater would total about 24 tons per day. Treatment of cooling water (to remove 1,700 lb per day of iron and manganese) would generate about 11 tons per day of wet sludge, while wastewater treatment would produce about 13 tons per day of wet sludge. Provided that the requirements of the Pennsylvania residual waste management regulations are met, these sludges would be placed in Mahanoy Creek valley on WMPI land that is permitted for disposal of coal byproducts under refuse reprocessing permit 54850202, issued by the Office of Mineral Resources Management in the Pennsylvania Department of Environmental Protection (Section 3.8). Although the sludges would likely qualify under Pennsylvania regulations for placement on WMPI land as part of mine reclamation, this assessment also considers the possibility that both types of sludges would be taken for disposal in a commercial landfill.

The placement of the proposed facilities' solid wastes and byproducts on lands that were previously mined or covered with culm banks would contribute to reclamation of surface-mined lands (i.e., contour grading and vegetation establishment) (Section 4.1.6.1). Reclamation activities and needs in the vicinity could easily absorb the volume of material that would be generated during the 3-year demonstration (Section 5 discusses corresponding potential impacts associated with commercial operation following the demonstration). Standard engineering practices such as silt fencing and straw bales would be employed during reclamation to prevent adverse impacts to surface waters from runoff, erosion, and sedimentation. Earthen berms or dikes could be needed to provide effective management for the large quantities of wet sludge. Periodic inspections by Pennsylvania Department of Environmental Protection personnel would help in monitoring the integrity of engineering controls to assure their effectiveness (Section 3.8).

If fine solids or sludges from the facilities failed to meet criteria for land application, they could require disposal in an offsite commercial landfill. Commercial landfill capacity in the region appears to be sufficient to handle the additional waste volume (Section 3.8). However, at any of the commercial landfills identified in Section 3.8, management of both the fine solids (200 tons per day, dry basis) and water and wastewater treatment sludge (up to 24 tons per day) would require special clearance from the Pennsylvania Department of Environmental Protection (Section 7.2) and could require modifications of operating procedures to avoid adverse effects on landfill operations. The additional waste would increase average daily waste volumes at either of the two nearest landfills (Section 3.8) by more than 10%. If sludges were transported to commercial landfills routinely, additional dewatering would probably be conducted to reduce weight and the potential for release of water after delivery. Special handling might also be required before shipment or within the landfill to control the release of water, which could affect the quantity and characteristics of landfill leachate. At least 11 daily truck trips would be required to deliver fine solids and sludge to the landfill. Roundtrip travel distance would be more than 20 miles to the nearest landfill (Commonwealth Environmental Services facility in Foster Township) and more than 50 miles to the other facilities.

About 13 tons per day of byproduct elemental sulfur would be produced and sold commercially. Sulfur has numerous uses in agriculture and industry. More than 10 million tons are consumed in the United States each year. This consumption exceeds domestic production, all of which is byproduct material from environmental control systems (Ober 2002). Given this domestic situation, the market should easily absorb the quantity (about 4,000 tons) that the proposed facilities would generate each year of the demonstration.

None of the proposed facilities' solid wastes and byproducts would be expected to be hazardous as defined under RCRA. The EPA's Toxicity Characteristic Leaching Procedure test would be performed to verify this expectation. Any wastes subject to RCRA hazardous waste regulations would be handled in accordance with standard procedures similar to those currently implemented at the Gilberton Power Plant.

Liquid Waste

Operation of the proposed facilities would generate several different liquid wastes requiring treatment or control. Liquid wastes from the gasification and liquefaction processes would hold various impurities collected in processing, offgas cleaning, and solid waste processing. Process wastewaters would have high organic loadings and would require treatment for substances including methanol and other alcohols, formates, ammonia, formic and acetic acids, cyanides, sulfides, and chlorides. Stormwater runoff collected from the facilities, coal piles, and other areas would require removal of oil and grease and other contaminants. Wastewater from demineralization of mine pool makeup water would have high concentrations in dissolved substances removed from the mine pool. Contaminants in wastewater released from the cooling water system would include proprietary biocides, corrosion and scale inhibitors (such as phosphates), chlorine, and other substances injected into the makeup and circulating streams to inhibit corrosion and fouling, together with high concentrations of dissolved solids (such as sulfates) not removed during initial water treatment.

Several wastewater collection and treatment units would be used to manage these liquid waste streams, based on technologies used successfully in other industries. Stormwater collected from process areas and stormwater from parking lots and other portions of the site not used for processing or materials storage would be collected in two separate lined retention basins. Wastewater from the gasification and liquefaction processes would be combined with stormwater from process areas in an equalization basin, then routed to a series of oil-water separation units where droplets of oil and grease would be recovered and oily sludge would be collected for disposal or recycling to the gasification process. Effluent from this stage of treatment would be mixed with non-oily wastewater streams and routed to a biological treatment unit that would combine aeration with clarification in order to treat wastewater with high levels of chemical and biological oxygen demand. An example of this type of system is the Advent integrated activated sludge system (Dorr-Oliver EIMCO, undated). This unit would be designed to consume the organic compounds and nutrients in the wastewater, yielding treated effluent for discharge and a biological sludge for disposal. Treated effluent would be mixed with non-process-area stormwater in an equalization basin for final settling and testing prior to discharge to a tailings pond in Mahanoy Creek valley.

Potential environmental impacts from liquid waste management would include objectionable odors, discharge of incompletely treated effluents, and the possibility of accidents involving fire or explosion in oil-water separation units. Potential impacts from odor would be controlled by treating all process wastewater within enclosed facilities prior to discharge to the final equalization basin. Treatment system upsets (e.g., if fluctuations in wastewater characteristics were to cause a die-off of microorganisms in the biological treatment unit) could result in release of incompletely treated water, causing odor problems and water quality degradation off the site. The potential for upsets could be minimized by designing the system with ample reserve capacity, selecting treatment units that are demonstrated to tolerate a wide range of wastewater characteristics, and controlling inflows to the treatment system to maintain consistent wastewater characteristics. Potential for explosion in oil-water separation units could be minimized by using a nitrogen gas blanket over these units.

4.1.9 Human Health and Safety

4.1.9.1 Public Health

During construction of the proposed facilities, potential health impacts to the public could result from fugitive dust emissions into the atmosphere (Section 4.1.2.1). However, these emissions would occur over a relatively short time period. WMPI would regularly use water spray trucks to dampen the material in construction areas to suppress the generation of dust.

Another potential health impact to the public would be associated with operational air emissions from the proposed facilities, including SO_2, NO_x, PM-10, CO, and hazardous air pollutants. Schuylkill County currently experiences a higher average annual rate of deaths than surrounding counties and Pennsylvania as a whole (Section 3.9.1). Therefore, any increase in regional air emissions could potentially be harmful to sensitive members of the general population. However, all maximum ambient concentrations of criteria pollutants from the proposed facilities were estimated to be less than their corresponding significant impact levels, and Air Quality Program Permit No. 54-399-034, issued by the Pennsylvania Department of Environmental Protection for the proposed facilities, establishes maximum allowable limits to ensure that the proposed facilities would be a minor new source of hazardous air pollutants (e.g., mercury) under the National Emissions Standards for Hazardous Air Pollutants regulations (Section 4.1.2.2).

With regard to potential accidents, a Hazard and Operability review or Process Hazards Analysis would be conducted as part of the facility operational safety requirements to identify and address potential hazards and operability problems that could adversely impact the safety of the facilities and nearby communities. The study would analyze selected what-if scenarios for potential accidents and develop preventive measures. A Risk Management Plan would identify safety precautions needed to avoid catastrophic accidents. Because the proposed facilities would produce and handle flammable fuels, equipment would be designed, constructed, and operated to meet federally approved codes and standards (e.g., American Petroleum Institute), which are enforced by Occupational Safety and Health Administration (OSHA) administrative mechanisms, design reviews, and regulatory inspections.

While catastrophic accidents would be possible, including accidents involving fire and/or explosion, the probability of such an incident would be remote. For example, flammable F-T fuels could be released from the facilities as a consequence of a potential reactor vessel and/or process tank failure. The estimated probability for such a potential catastrophic vessel/tank failure is approximately one occurrence per 2,500 years (ConocoPhillips 2003). Failures would primarily be due to cracks. Given a catastrophic failure, the probability that the failure would result in fire or explosion is estimated to be one in 40; consequently, the probability of fire or explosion caused by a catastrophic vessel/tank failure would be about one occurrence per 100,000 years, which is a frequency of 1×10^{-5} per year (ConocoPhillips 2003). Similarly, an analysis involving fire or explosion resulting from the release of flammable F-T fuels due to catastrophic pipe failure yields a frequency of approximately 1×10^{-4} per year, or one occurrence per 10,000 years (ConocoPhillips 2003).

With respect to potential accidents associated with transport of the produced liquid fuels from the proposed facilities, the U.S. incidence rate for a serious railcar accident involving hazardous materials resulting in a release or injury is approximately 7 accidents per million train-miles (ConocoPhillips 2003). For the proposed project, because a train of filled tank cars would be moved off the site only once per week (Section 4.1.7.8) and because fuels produced by the proposed facilities would be transported to local distribution centers and/or refineries within a 150-mile radius, a rail accident involving the tank cars would be very unlikely.

The facilities would have onsite firefighting and emergency response capabilities with an approved Emergency Response Plan in place to ensure that, in the event of fire, hazardous material release, or medical emergency, facility personnel would be able to respond quickly and effectively so that personal injuries, environmental damage, and/or property damage would be minimized. Facility personnel would be fully trained in Hazard and Operability response, along with other safety training such as injury and emergency reporting procedures, location and use of firefighting equipment, and proper methods of handling chemicals and catalysts at the facilities.

4.1.9.2 Electromagnetic Fields

The proposed facilities would tap into the existing Hauto-Frackville #3 69kV transmission line. The new generators would be connected to the 69kV line by constructing a short (less than 100-yard) 69kV interconnect from the new generators to the existing transmission line. The interconnect would operate far from any residence. Because no new transmission line would be built, no perceptible changes to existing EMF levels would occur. Consequently, EMF-related health effects, if they exist, would continue unchanged and small (NRC 1997).

4.1.9.3 Worker Health and Safety

Potential health impacts to workers during construction of the proposed facilities would be limited to the normal hazards associated with construction (i.e., no unusual situations would be anticipated that would make the proposed construction activities more hazardous than normal for a major industrial construction project). Most accidents in the construction industry result from overexertion, falls, or being struck by equipment (NSC 2003). Construction-related illnesses would also be possible (e.g., exposure to chemical substances from spills).

The Bureau of Labor Statistics reported 1,126 fatalities and 408,300 nonfatal occupational injuries and illnesses in the United States in 2003 for the construction industry (Section 3.9.3). During the same year, Pennsylvania recorded 39 construction-related fatalities. Based on the national statistics applied to an average of 516 workers on the site, the proposed project could expect 0.2 fatalities and 79 nonfatal injuries and illnesses during the 30-month period of construction.

The proposed facilities would be subject to the OSHA General Industry Standards (29 CFR Part 1910) and the OSHA Construction Industry Standards (29 CFR Part 1926). During construction and operation of the proposed facilities, risks would be minimized by WMPI's adherence to procedures and policies required by OSHA and the state of Pennsylvania. These standards establish practices, chemical and physical exposure limits, and equipment specifications to preserve employee health and safety. Construction permits and safety inspections would be employed to minimize the frequency of accidents and further ensure worker safety. Construction equipment would be required to meet all applicable safety design and inspection requirements, and personal protective equipment would be used when needed to meet regulatory and consensus standards.

The Bureau of Labor Statistics reported 32 fatalities and 24,500 nonfatal occupational injuries and illnesses in the United States in 2003 for the utilities industry (Section 3.9.3). During the same year, Pennsylvania recorded no utilities-related fatalities. Based on the national statistics applied to 250 workers during operations, the proposed project could expect 0.04 fatalities and 32 nonfatal injuries and illnesses during the 36-month period of demonstration. To maximize worker safety, operations would be managed from a control room. All instruments and controls would be designed to ensure safe start-up, operation, and shut down. The control system would also monitor operating parameters and perform reporting functions. Control stations would be placed at remote locations at which operator attention would be required. Therefore, the overall design, layout, and operation of the facilities would minimize human hazards. Compliance with the Federal Occupational Safety and Health Standards, as well as safety standards specified by the state of Pennsylvania and WMPI PTY, LLC, would help maintain occupational safety.

WMPI PTY, LLC, would develop supplemental detailed procedures for inclusion in the proposed facilities' Occupational Safety and Health Program to assure compliance with OSHA and EPA regulations and serve as a guide for providing a safe and healthy environment for employees, contractors, visitors, and the community. These procedures would include job procedures describing proper and safe manners of working within the facilities (e.g., handling and storage of ammonia would comply with 29 CFR 1910.111), appropriate personal protective equipment (complying with 29 CFR 1910.132), and appropriate hearing conservation protection devices. The manual would be used as a reference and training source and would include accident reporting and investigation procedures, emergency response procedures, toxic gas rescue-plan procedures, hazard communication program provisions, material safety data sheet accessibility, medical program requirements, and initial and refresher training requirements. In addition, supplemental provisions would be added to the proposed facilities' Contingency Plan for Hazardous Waste, Spill Prevention Control and Countermeasures Plan, Hazardous Substances Response Procedures, and Air Pollution Emergency Episode Plan.

4.1.10 Noise

During construction of the proposed facilities, the principal sources of noise would be from construction equipment and material handling. The amount and type of construction equipment would vary depending on the specific construction activity occurring at that time (e.g., site excavation, structural steel/mechanical/electrical equipment erection and installation, piping, fabrication, etc.). Construction activity would primarily occur within 6 acres of the 75-acre main plant site.

The proposed facilities would be built next to the existing Gilberton Power Plant. To mitigate the impacts of construction noise, employees and contractors would be responsible for ensuring that exhaust mufflers and engine enclosures are in place and in good working order for all industrial trucks and other pieces of construction-related equipment. An exhaust muffler is a device that deadens the noise of escaping gases or vapors through which the exhaust gases of an internal-combustion engine are passed. An engine enclosure silences low-frequency noise radiated from the engine. Exhaust mufflers and engine enclosures are commonly used, and are commercially available from many different manufacturers. All construction equipment would be properly maintained.

During operation of the proposed facilities, the principal sound sources would include equipment like the combustion turbine/generator, steam turbine/generator, heat recovery systems, turbine air inlets, exhaust stacks, cooling towers, pumps (e.g., feed, circulating, etc.), and compressors.

These sound sources would be enclosed and acoustically insulated. Noise sources within the buildings would be fitted with sound-attenuating enclosures or other noise dampening measures that would meet all state and federal regulations and WMPI PTY, LLC noise standards (WMPI PTY, LLC, e-mail to Robert L. Miller, ORNL, May 30, 2004). During maintenance or repair events, workers would be required to wear hearing protection equipment.

The proposed project site's highest sound level measurement was documented at 55 dB(A) in March 2003 (Section 3.10). For comparison, 55 dB(A) is the approximate level of a quiet subdivision during daylight hours. This level is also given by the EPA as a guideline upper limit with an adequate margin of safety for protection from activity interference and annoyance during the daytime in outdoor locations "in which quiet is a basis for use" (EPA 1974).

To analyze the incremental noise effects resulting from the proposed facilities, a doubling rule was used, which provides the most convenient way to perform simple arithmetic functions involving logarithmic measurements, such as dB measurements (MPCA 1999). The doubling rule provides an accurate estimate of the effect of distance and multiple sources on measured sound pressure levels. To estimate the highest sound level during simultaneous operation of the Gilberton Power Plant and the proposed facilities, the sound generated by the two facilities was assumed to be equal. According to Goodfriend and Associates (1971), power plant sound levels are similar due to comparable noise sources such as induced- and forced-draft fans, turbine generators, and air compressors. A doubling of sound energy yields an increase of 3 dB (MPCA 1999), indicating that the proposed site's highest sound level measurement would be 58 dB(A). As a basis for evaluating an increase of 3 dB, a change in sound level of plus or minus 1 dB is not perceptible to the human ear, a change in sound level of plus or minus 3 dB is the threshold of perception to the human ear, and a change of plus or minus 5 dB is clearly noticeable to the human ear (MPCA 1999).

The center of the proposed main plant would be about 2,600 ft west of the Mahanoy State Correctional Institution. The increase in noise levels (i.e., 3 dB) would probably be imperceptible because of (1) the distance between the prison and the proposed project site, (2) planned noise attenuation measures, (3) natural and man-made terrain features and structures, and (4) the limited period during which the inmates are allowed outside the sealed prison. No perceptible change in noise associated with the proposed facilities would be expected at the nearest residence, located 3,600 ft southeast of the proposed main plant, or other offsite locations.

4.2 POLLUTION PREVENTION AND MITIGATION MEASURES

Pollution prevention and mitigation measures have been incorporated by WMPI as part of the design of the proposed project. The proposed facilities’ use of anthracite culm as feedstock would allow reclamation of land currently stockpiled with culm and would provide a beneficial use for the material at operating mines. Also, the quality of water returned to the mine pool following use by the proposed facilities would be improved. WMPI plans to sell the coarse slag and elemental sulfur as byproducts to offsite customers. In addition, mitigation measures have been developed to minimize potential environmental impacts. Table 4.2.1 lists the pollution prevention and mitigation measures that WMPI would provide during the construction and operation of the proposed facilities.

4.3 ENVIRONMENTAL IMPACTS OF NO ACTION

Under the no-action alternative, DOE would not provide cost-shared funding to demonstrate the commercial-scale integration of coal gasification and F-T synthesis technologies to produce electricity, steam, and liquid fuels. At the site of the proposed project, it is reasonably foreseeable that no new activity would occur (Section 2.2.1). Thus, under the no-action alternative, no construction or operation of the proposed facilities would occur. No site preparation would be required, such as clearing of trees and other vegetation, site leveling, and the construction of onsite roads, parking lots, fences, and stormwater drainage areas. No employment would be provided for construction workers in the area or for operators of the proposed facilities. No resources would be required and no discharges or wastes would occur. This scenario would not contribute toward the removal of anthracite culm, which is stacked locally in numerous piles that were set aside during previous mining of anthracite coal because of their inadequate quality.

Current environmental conditions at the site would not change. Specifically, air quality in the area would remain the same, and no changes would occur to existing geologic and soil conditions in the area. No changes would occur to the quantity and quality of surface water and groundwater and the availability of water supplies in the area. Ecological resources would remain the same. No changes would result to the current management of solid and hazardous waste in the proposed project area.

The adjacent Gilberton Power Plant would continue to operate without change. Levels of resources used and emissions, effluents, and wastes discharged would remain the same. The generation and beneficial reuse of bottom ash and other byproducts from the existing plant would continue, including the sale of bottom ash as an anti-skid material for roads and as construction fill or aggregate.

Table 4.2.1. Pollution prevention and mitigation measures developed for the proposed facilities

Environmental issue	Pollution prevention or mitigation measure
Atmospheric resources and air quality	During construction, water spray trucks would dampen exposed soil with water as necessary to minimize the occurrence of fugitive dust during construction activities.
	During site preparation, cleared vegetation and non-hazardous construction waste would be burned. The fire chiefs of Mahanoy and/or West Mahanoy Townships would be notified prior to each occurrence. Open burning would not be conducted during drought conditions in which advisories have been issued by the Pennsylvania Department of Environmental Protection.
	During construction and operation, vehicles and machinery would be equipped with standard pollution-control devices to minimize emissions.
	To reduce particulate emissions from handling and transfer of anthracite culm, petroleum coke, and limestone, the number of handling and transfer points would be minimized, the conveyors and material unloading points would be enclosed, and wetting systems and collection devices (e.g., baghouses) would be installed.
	A very high percentage of trace elements in the synthesis gas would be removed because the integrated technologies would require extensive cleaning of the synthesis gas using wet scrubbing followed by acid gas removal using a Rectisol unit.
	Odorous emissions of hydrogen sulfide (H_2S) should not be perceptible because H_2S would be removed from the shifted synthesis gas in the acid gas removal plant using a Rectisol unit and would be converted to marketable elemental sulfur in a Claus sulfur recovery unit, a process which should remove approximately 99.99% of the sulfur from the gas stream. The gas stream exiting the Rectisol unit would be sent to a thermal oxidizer to destroy any trace contaminants prior to being released through a stack to the atmosphere.
	Upon initial operation, conditions at Interstate 81 would be monitored and flashing lights to warn motorists of fog would be installed, if warranted.
Geological resources	The proposed facilities would increase the removal and utilization of anthracite culm deposited on the landscape of the surrounding area, which would accelerate the ongoing process of restoring soil productivity and would help to reduce the potential for culm bank fires.
	Product rundown lines would be designed to withstand flooding and earth slides. The potential risks of product line leakage due to gradual subsidence would be reduced by inspecting product lines regularly and repairing any problems.
	The potential for accidental releases from seismic activity would be reduced by incorporating seismic safety design features into the facilities.

Table 4.2.1. Continued

Environmental issue	Pollution prevention or mitigation measure
Water resources	During construction, standard engineering practices such as silt fencing, straw bales, and revegetation of graded areas would be implemented to control runoff, erosion, and sedimentation that could affect other watersheds. Accidental spills of construction materials such as solvents, paint, caulk, oil, and grease that could contain hazardous substances would be cleaned up in a timely manner and in accordance with a Spill Prevention, Control, and Countermeasure Plan and Best Management Practices Plan, thus minimizing the potential for overland flow into streams. The state of Pennsylvania would be able to reduce by approximately 38% its pumping of water from the Gilberton mine pool to Mahanoy Creek to control the mine pool elevation. Discharge of treated effluent to the mine pool would be expected to reduce concentrations of acidity and dissolved metals in the mine pool, and thus also in the water pumped to Mahanoy Creek from the mine pool. Development of the proposed facilities could affect groundwater availability by increasing the area of impervious surface, thus reducing groundwater recharge to the aquifers on Broad Mountain. If the reduced recharge affected the availability of groundwater to the well serving the Gilberton Power Plant, the facilities' owners would address the situation by establishing a connection with one of the public water suppliers. Most potential impacts to groundwater quality on Broad Mountain would be avoided by implementing standard engineering practices, including collection of potentially contaminated runoff and cleaning up accidental spills in a timely manner. The proposed septic system would be designed and operated in accordance with permitting requirements and would only receive wastewaters similar to those generated by households.
Ecological resources	Excavated areas surrounding the proposed facilities would be reseeded following construction, and compatible areas would be allowed to revert to forested conditions. During reclamation of culm banks, the land surface would be graded to minimize erosion, and vegetation would be established. Over the long term, the terrestrial habitat created on reclaimed lands would offset the 76.5 acres of deciduous forest that would be cleared for the proposed facilities.
Traffic	Additional construction- and operations-related traffic, which would affect traffic flow and safety on State Route 61 and State Route 1008, could be mitigated by signaling, road widening, or scheduling work hours and/or deliveries to avoid periods of heavy traffic.

Table 4.2.1. Continued

Environmental issue	Pollution prevention or mitigation measure
Waste management (solid)	Excess supplies of new materials would be returned to vendors, retained by the facilities for future use, or transferred in settlement with subcontractors (who could retain the items for use in future projects). Surplus paint and other consumables, partial spools of electrical cable, and similar leftover materials would also be retained for possible future use in maintenance, repairs, and modifications. Metal scrap not suitable for future use in the facilities would be collected for resale to scrap dealers or recyclers. The gasifier slag would be marketed for sale. Potential uses include lightweight construction aggregate, asphalt roofing shingle granules, blasting grit, and pipe bedding material. Any slag not used commercially would be used as fill material for mine reclamation. Compliance with 25 Pennsylvania Code Chapter 287 would minimize the potential for adverse impacts to water quality from beneficial reuse of slag and other byproducts. Some fine solid material could be captured and returned to the gasifier for energy recovery. The majority of the material would be placed on WMPI land that is permitted for disposal of coal byproducts as part of mine reclamation. Sludges from treatment of raw water and wastewater would be placed on WMPI land that is permitted for disposal of coal byproducts as part of mine reclamation. Sulfurous compounds would be converted during processing to marketable elemental sulfur. The proposed facilities' solid wastes and byproducts would not likely be hazardous as defined under RCRA. The EPA's Toxicity Characteristic Leaching Procedure test would be performed to verify this. Any wastes subject to RCRA hazardous waste regulations would be handled in accordance with standard procedures similar to those currently employed at the Gilberton Power Plant.
Waste management (liquid)	Potential impacts from odor would be controlled by treating all process wastewater within enclosed facilities prior to discharge to the final equalization basin. The potential for upsets in biological treatment units could be minimized by designing the system with ample reserve capacity, selecting treatment units that are demonstrated to tolerate a wide range of wastewater characteristics, and controlling inflows to the treatment system to maintain consistent wastewater characteristics. Potential for explosion in oil-water separation units could be minimized by using a nitrogen gas blanket over these units.

Table 4.2.1. Concluded

Environmental issue	Pollution prevention or mitigation measure
Worker health and safety	During construction and operation, risks would be minimized by WMPI's adherence to procedures and policies required by OSHA and the state of Pennsylvania. These standards establish practices, chemical and physical exposure limits, and equipment specifications to preserve employee health and safety.
Noise	Employees and contractors would be responsible for ensuring that exhaust mufflers and engine enclosures are in place and in good working order for all industrial trucks and other pieces of construction-related equipment. During operation, the principal sound sources (i.e., combustion turbine/generator, steam turbine/generator, heat recovery systems, turbine air inlets, exhaust stacks, cooling towers, pumps, and compressors) would be enclosed and acoustically insulated. Noise sources within the buildings would be fitted with sound-attenuating enclosures or other noise dampening measures that would meet all state and federal regulations. During maintenance/repair events, workers would be required to wear hearing protection equipment.